TRS-80 COLOR COMPUTER

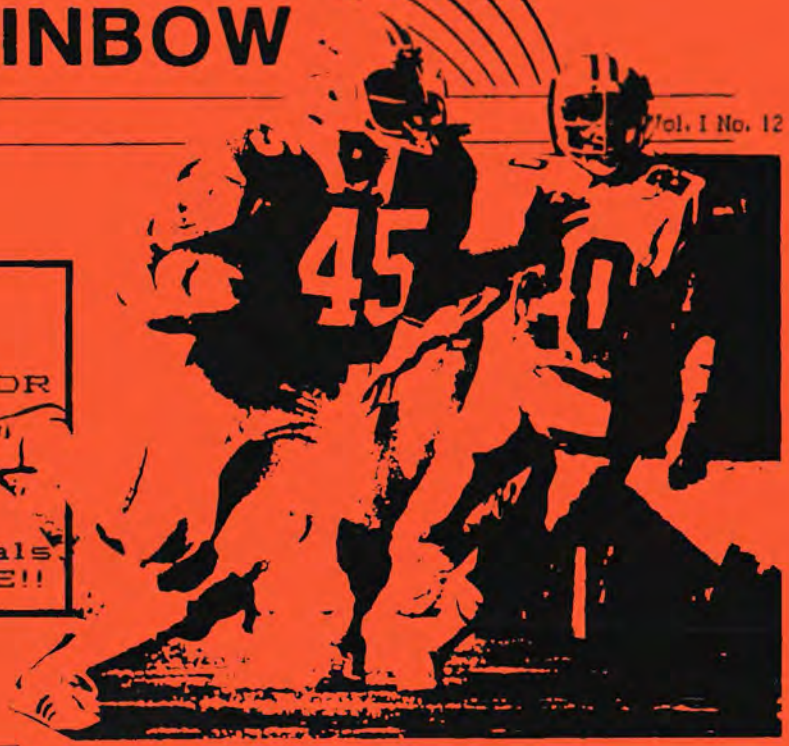
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JUNE, 1982
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the RAINBOW

The Monthly Magazine for Color Computer Users

Vol. I No. 12



Under the RAINBOW

Swamp and Ice Games
Using SPECTACULATOR
Printer Mysteries
Reviews

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Assembly Language Column
Fantasy Game Aids

Editor's Notes...

PRINT #-2,

This issue completes one whole year of publishing *the RAINBOW*.

We won't go into a lot about it all this time out, because we consider our July issue to be the "official" anniversary issue. While you will see some changes in this month's edition, we hope and are now planning for some more next month. All we can say is watch for them. We hope you will be pleased.

* * * * * * * * *

You read here last month about some preliminary plans for *the RAINBOW*'s new Seal of Certification. Those plans are coming into being now, and we call your attention to the inside of this month's issue, where full details are given. We have received a great deal of good comment from you, our subscribers, and from many of the vendors too, about the Seal program. We hope you will take a moment or two out to look at the article about the Seal. The entire program was

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the RAINBOW
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LAWRENCE C. FALK — Editor

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The **RAINBOW** is published every month of the year.

PRINT #-2 (From Page 1)

designed with you in mind.

While on the general subject of advertising, we do want to again encourage you to let our advertisers know you "saw it in *the RAINBOW*." Our first edition was four photocopied pages. This month's is well over 60. The plain truth is that growth of that sort -- and the ability to deliver more information to you on time every month -- is dependent on advertising. We can continue to grow, and to provide you with more information, only as our advertising grows. So, do patronize our advertisers -- and be sure to tell them where you read about it. We admit that helps us, but it helps you, too.

* * * * * * * *

Big news! As part of the special Adventure edition we are preparing for the fall, we will have an Adventure Contest. First prize is guaranteed to be no less than $100 (we're still working out prize details).

In order to be eligible for the contest, you must write an Adventure game, submit it on tape or disk, and it must be received no later than September 1. All programs become the property of *the RAINBOW*, of course, and the winning Adventure will be published in *the RAINBOW*, along with information about who the winner is.

Do not submit any Adventure that is commercially available. And, there will be several prizes, so you don't have to win it all to get something out if this. As we mentioned, there will be further details on the prizes later.

In the meantime, watch for some help in writing Adventures. But remember, the program has to be an original creation of your own (no adaptations) and you will be disqualified if we get an error message of any kind while running the program. So debug your submission throughly.

The Adventure you submit may be word-oriented or graphic-oriented (or a combination of both). It can have any theme and must, of course, be written for the 80C. Also, when making your submission, be sure to include your name, address and phone (we have to know where to send the prize) and tell us how big a system is required to run the program. Please supply instructions and a hard copy listing as well.

* * * * * * * *

Finally, we want to emphasize two things again. First of all, we welcome your letters -- be they of praise or criticism. We want to continue to put out the finest computer magazine available and we can only do that if we are responsive to what you want. And we do listen. The little boxes which appear in this issue for the first time with system requirements for programs are the result of reader requests. So is the Table of Contents which first appeared last month.

Second, please remember *the RAINBOW* is dedicated to the betterment of the 80C. One of the things we think helps a lot are Color Computer Clubs or Special Interest groups. We'll be most pleased to give information on how other 80C owners can contact a club if you will just ask us to do so in writing.

* * * * * * * *

Last but not least. Since summertime is a "moving experience" for many of you, please be sure to inform us well in advance of your new address, including ZIP code. We'll make the change as quickly as possible, but if you delay, you may miss an issue. The Postal Service will not forward bulk rate mail.

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LETTERS TO RAINBOW

MESSED UP LETTER

Editor:

You published my letter in the April *RAINBOW* under the heading "More Random Thoughts." However, there is a typographical error in Line 40. As published it reads "40 IF A<1 THEN GOTO 30". It should read "40 IF A<2 THEN GOTO 30". It makes no sense the way it was published.

Rita Lawry
Cleveland, OH

PLEASED

Editor:

Firstly, let me say I enjoy your publication very much. It would like to see more programs in it for non-technical users like myself who don't have printers, disk drives and just want to play.

I would like to tell you about one of your advertisers, Spectral Associates of Tacoma, WA. A while ago, I wanted to upgrade my 16K to 32K so I bought their "Ramcharger." When I received the board, I followed their simple instructions carefully, but the board would not seat right in my 80C.

I talked to the technicians at Spectral and, though they were very helpful, I still could not get the board to seat because of one of the components of my machine. Apparently when my machine was put together, the component was installed abnormally higher and, through no fault of Spectral's, the Ramcharger would not work.

With all the disclaimers associated with the software and hardware industry, I expected I would either have to take the computer to the Radio Shack service people to have the problem corrected at my expense or give up the idea of installing my own upgrade. I sent the board back to Spectral explaining the problem, and four days after I mailed it to them I received back another board designed and built expressly for my particular computer.

I easily installed the board and it works perfectly. In my opinion Spectral went far above and beyond in dealing with my dilemma and I would like to commend them and recommend them to your readers.

Bob Symonds
Manchester, CT

CLUBS

Editor:

We are a new club whose primary interest is the 80C. We are just getting started.

Anyone interested can contact Andrew Thomas, 2804 E. 55th Place, Suite Q, Indianapolis, IN, 46220.

Andrew Thomas
Indianapolis

Editor:

We have started an 80C group here in Indianapolis with about 15 members. Those interested can contact Robert Carr, 1937 N. Emerson Ave., Indianapolis, IN, 46218.

Robert Carr
Indianapolis

Editor:

We are starting a Color Computer Club in Columbus, OH. So far, we have about 20 people who are interested. Surely there must be more people in the central Ohio area who have or are interested in purchasing an 80C. Anyone interested can call Susan Davis at (614) 861-0565.

Thank you for passing along this information.

Susan Davis
Reynoldsburg, OH

MX-80 GRAPHICS

Editor:

I too, like George Klement of Grandview, MO, have a 32K Extended 80C using Computerware's upgrade kit and an Epson MX-80. I am finally able to print graphics.

I am interfacing the Epson with MicroWorks' PI80C. I have an older 80C with the 1.0 ROM. After spending considerable amounts of money for all this hardware, I thought I could hook it all up and get it to work.

After many phone calls, and genuine interest from the people at Micro Works, I found out what was needed to make it happen.

First of all, the Radio Shack Screen Print program does not enter the picture. One does need the PTFX16 program that Radio SHack supplies for free, and a special driver program that was supplied, in this case, by Micro Works. First you CLOADM the PTFX, the CLOAD the driver routine (it is in BASIC) and then create your graphics program before the driver. Voila! Graphics to the printer.

Also, I agree with Glenn Knight, Glen Burney and Jim Rauh about the content of articles and advertising. There may be some wizards out there too, but it is the user who is the focal point of software and hardware support.

Finally, Norman Place of Florida: I'll be right behind you ordering a good music composer program if, indeed, someone invents one.

The truth of the matter is I am thrilled with the progress that 80C supporters have made in the last year and my compliments to *the RAINBOW* for doing such a wonderful job.

Bob Safir
Los Angeles, CA

GENERAL HELP

Editor:

Its not completely clear to me what Edgar Poulin is asking for, but he can set the printer width by POKEing the number of columns into 155. Perhaps he was the victim of the typo in the Extended Basic manual where it says 115. If he wants something else, he can get in touch with me at 291 South Main St., Andover, MA, 01810.

Likewise, I am not sure exactly what Ralph Coleman is referring to. If he can't get the sample programs on page 162 to run, either he is doing something fundamentally wrong or he has a defective ROM. Two minutes with a Radio Shack salesman should resolve which. If he is trying to get assembly code to run, he could have a plethora of problems. The most likely is he is zapping a machine register used by BASIC. My recommendation is he start his code by pushing everything but the program counter to the stack (PSHS U, X, Y, DP, B, A, CC) and exit by pulling everything (including the program counter, PC) from the stack.

In reference to *SPECTACULATOR*, I agree it is super, but I'm discovering some design pecularities. Among those I find most irksome are lack of tape positioning capability, the fact that the formatting capabilities are not a little more sophisticated and the way formulas are handled. Overall, except for

tape positioning, I think it is a well thought out and well implemented product that is very useful.

Don Kenney
Andover, MA

(EDITOR'S NOTE: See the special article on SPECTACULATOR by Dick White in this month's issue. More of these are forthcoming.)

COLORFUL SCREEN

Editor:

Do you hate looking at the same old green screen of the 80C?

Have you noticed that when you use the SCREEN command that, unless you use it in a program, the screen it produces only blinks on?

Try this yourself: Type in SCREEN 0,1. See that the screen stays pink for only a split second. Well, I did some messing around with POKEs and found that if you POKE 359,13 and then use screen commands like SCREEN 0,1 the screen produced is permanent (unless you press RESET or do the remedy POKE, POKE 359,126).

A lot of people think they know the best way to PCLEAR0. I am one of those people. The best, shortest and easiest way is POKE 25,6:POKE 31,6. It does not clear the program from memory. Location 26 (and 26) contain the location of the beginning of the BASIC program and location 31 is the same, except it is used for the NEW command.

Roger Cauvin
Austin, TX

SECRET PROGRAM

Editor:

I came up with a "secret program" routine. Its fun. You can have hidden lines or make a listing appear what it isn't.

Try this:

10 FOR Y=100 TO 110:' followed by 19 asterisks and then 10 FOR X=1 TO 8

20 SOUND Y,10:' followed by 14 asterisks and then 20 CLS(X)

30 NEXT

```
1  D=256*peek(25)
2  FOR Y=D TO D+200
3  IF PEEK(Y)=42 THEN POKE Y,8
4  NEXT:DEL -5
```

When run, 80C starts before the program and checks for asterisks. It replaces each with a backspace (ASCII 8). Although it runs a sound program, a listing shows a clear screen in eight colors.

Mr. Poster
S. Hackensack, NJ

PROGRAM CHANGE

Editor:

Thank you for the review of our program, *MONEY MINDER II* in the April issue. And thank you for a really excellent magazine.

Because of the review, we have re-written the documentation for *MONEY MINDER II*. We have also made a couple of changes to the program which allow greater operator convenience.

Jay Hoggins, Harmonycs
Salt Lake City, UT

SOUND ADVICE

Editor:

My first *RAINBOW* arrived today. I love it. Its so nice not having to check everything before I read it (to throw out the bad apples, if you know what I mean). Just don't forget about us poor relations struggling along with 4K.

Thanks to Cameron Price for his AUDIO ON advice for CSAVEing a program. I lost a lunar lander program by forgetting to push record and then clearing memory to check my tape.

There is an error in Line 50 of MY OWN MONEY #3. It should be JJ=AW-IT. Otherwise you are told your taxes instead of your refund.

Dennis Church
Collinsville, IL

GETTING TOGETHER

Editor:

I would just like to let you know how much I enjoy your magazine. I have had my 80C for about 20 months now and have been starving for more information. Your magazine satisfies most of that need.

I converted my 80C to 32K myself and had the same problem as James Richter. I had a bunch of 4K programs that were too much trouble to load but I didn't want to throw them away. So, I came up with this method for merging programs together.

To start, turn the 80C on and enter PRINT PEEK(25),PEEK (26)

If you do this before you run any programs or clear any memory, decimal address 25 should contain a decimal 30 and decimal address 26 should contain a 1. Now CLOAD your first program and renumber it if necessary. Then, enter the following command: POKE 25,PEEK(27);POKE(26),PEEK(28)-2

This sets up pointers to the end of the previous program and prevents the next program from being loaded on top of it. Now you can CLOAD another program. For each program that you want to merge, simply POKE the addresses as above and then CLOAD and renumber it so that the first line number is higher than the last line number of the previous program. A PRINT MEM command will show you how much memory is available.

When you have CLOADed the last program, enter the following command: POKE 25,30:POKE 26,1

This sets the pointers back to the start of the first program. Your programs are now merged. By renumbering them and adding a menu, you will have merged several programs and made them work as one.

One word of caution: If you merge programs and use DATA statements or the same variables your programs may go bananas if you don't change them. Also, do not try to run programs while doing this.

This method is more simple than the one mentioned in your Letters coluan previously and will save wear and tear on the cassette cable, too.

Dennis Weide
Albuquerque, NM

(EDITOR'S NOTE: This routine was published in one of the earliest editions of the RAINBOW. We're running this letter because Mr. Weide obviously discovered it independently and, since we have so many new readers, we thought it would be helpful to do this again.)

HARDWARE MAN

Editor:

I have to take umbrage with Jim Rauh's remark in April. I am a Hardware Man and have been since my cruise in WW II as a Navy Electronics Technician. From my talking with others I know there are a lot of us hardware types in the 80C ranks.

We hardware men do have a real area of interest in common with Mr. Rauh and his "novice and semi-technical types." We, like you, would love for someone to help us learn to operate and use this lovely piece of machinery.

For instance, I have one of the very first 80C's. I also have one of the first LP VIII's. *But*, there is not one place in either of the 80C manuals or the LP VIII manual that shows a written program of how to have these two units function together.

I can't close without saying a good word for Dave and his gang at *Chromasette*. The programs and games on his tapes have helped me learn more about 80C than all the non-info in both manuals that came with the computer.

Russell Hokanson
Covina, CA

---

the ASSEMBLY CORNER

By Dennis S. Lewandowski
Rainbow Columnist

This month I would like to start the column with a small observation I have made. It seems almost every magazine concerned with the 80C has begun a series of articles concerning Assembly Language. It would seem that the question would come up of which is the best series to follow.

Well, putting in my two cents worth, I would say ALL of them. No two people share the same exact experiences or writing style. Therefore, if you are serious about gaining information about this subject, read and try all sources available. I know I do.

Before we start, let's all open to page 271 of *Getting started with COLOR Basic.* Here we have what is called a "Memory Map" of the inner workings of 80C. The addresses of the items listed on this page are in both hex and decimal. I will always refer to an address on this map in HEX. I will also use a dollar sign to denote the address as Hex. The "$" symbol is used by most editor/assembler packages to represent Hex.

Now to the task at hand, Indexed Addressing. This has to be one of the most powerful, and useful, methods of accessing and using data in the 80C. Let's look over Program Listing #1 step by step and see what's happening.

The first thing we will do is set up our index registers by loading them with the correct areas of memory we are going to use. We'll load the "X" register with $0400. What's at $0400? The video display of the 80C. The display occupies $0400 to $05FF (or 1024 to 1536 if you insist on decimal). Next, we load the "Y" register with $A000. At this location we have the start of ROM memory in a non-extended 80C. Now we have two pointers set at different areas of memory -- one pointing at RAM, the other pointing at ROM. Sounds interesting already.

How about that word in the listing "LOOP"? This is what we call a label. Since the assembler does not recognize line numbers, as BASIC does, we have to use labels to identify a particular memory location to the assembler. In the same line, we have LDA Y+ LDA is assembler shorthand for LoaD A. The comma tells the assembler we wish to use the indexed mode of addressing. The "Y" is, of course, the register we want to use as a pointer. And the plus sign means the Y register will automatically be INCremented (added to by 1) once the instruction is executed. The same is true of the next line, except this time we are STore(ing) A in the memory location

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that the X register is pointing to.

OK. So far, so good. We have taken the contents of memory location $A000 and LoaDed it into the "A" register. Then we STore the contents of the "A" register in memory location $0400. A few other things have happened as well. After "A" was LoaDed with the contents of $A000, the "Y" register was INCremented by 1. So the "Y" register now contains $A001. The same follows once the contents of "A" was STored in $0400, and the "X" register is now at $0401.

This will help explain lthe next instruction, CMPX #$0600. We know, from the memory map, that the screen ends at $05FF. We should also be aware that if we continue to fill memory with the contents of ROM, we will soon overwrite our program. Therefore since we cannot see (on the screen) what's happening, this is where we will stop this data movement.

By using the CoMPare instruction, we have told the CPU: "HOLD IT JUST ONE NANOSECOND!" We want to see if you've done your job yet. So, being very obedient, the CPU checks the "X" register and sees if it matched the IMMEDIATE data of $0600. Since this is only the first pass through the program, and "X" contains $0401, it just continues along its merry way. If it had found $0600 it would set the zero flag which would say "YES, the 'X' register is EQUAL to $0600." The following line is a test BEQ DONE. This is a simple example of the LOGIC, or decision-making ability of your 80C.

Branch if EQual or BEQ tells the CPU what you want done with the results of the CoMPare. When the "X" register does equal $0600, the CPU will add the Program Counter to a predefined number (defined by the assembler when it calculated the Branch), and release 80C from the LOOP we have set up. Kind of remind you of a FOR-NEXT loop in Basic?

The next instruction really makes our LOOP. BRanch Always or BRA LOOP, Branch when? ALWAYS! NO questions asked, no compares, nothing! Just keep going to LOOP. We do want to fill the display screen? So we set up an infinite loop. If not for the compare we did earlier, this program would go on forever.

Well, that's the main body of the program. How 'bout this other stuff? The next line, DONE, is a label, JSR $A1C1 is a Jump to SubRoutine at ROM location $A1C1. In a JSR -- Jump to SubRoutine -- the CPU knows its just leaving the main program for a while, and expects to return. (Similar to Basic's GOSUB command). So the CPU will "STACK" all the registers, perform the subroutine, and return to the program. The real beauty of using subroutines is that you don't have to write all the extra code, which should make your program more compact.

This is a very handy subroutine indeed. It is the keyboard scan routine, without the cursor, kind of an INKEY$ command for machine language. This next line may be confusing to you. When you jump to a subroutine, you actually are going to another machine language program. The subroutine for the keyboard scan will return a zero in the "A" register if you do not press a key. By using the next line, BEQ DONE, we allow the subroutine to do the CoMPare for us. These two lines will hold the screen frozen so we may look at it until we press a key. Once a key is pressed, the "A" register is loaded with the Hex value of that key and will NOT be zero. Since we have left no other instructions for the CPU, it has no choice but to execute the last line. This is a method of programming sometimes called Fall-Through Programming.

The final instruction returns our 80C to its familiar face, BASIC. JMP $A027 is a mandatory JuMP to Basic. You'll notice we didn't branch. We could have, if we used the LBRA instruction. But we wanted to show some true end to this program, and I'll try to use as many instructions as possible to get you familiar with them.

Now I can see your getting ready to pull 80C out and try this program so I won't hold you up much longer. We'll continue this topic next month. But before you go, may I suggest you try playing with this short program? That's right PLAY with it. Try things like, leaving the "+" off the LDA ,Y+ instruction, or load "Y" with different value in ROM, or even RAM. How about LDA ,Y++? HMMMMM, could you set this up to search memory for give byte?

We'll see you next month.

```
        LDX   #$4000  LoaD X with video
        LDY   #$A000  LoaD Y with ROM
LOOP    LDA   ,Y+     LoaD A with Y pointer
        STA   ,X+     STore A at X pointer
        CMPA  #$0600  Have we filled the screen?
        BEQ   DONE    YES, then DONE
        BRA   LOOP    NO then LOOP
DONE    JSR   $A1C1   Check keyboard
        BEQ   DONE    No press check again
        JMP   $A027   GOTO BASIC
```

Software Review...

THE SOLUTION USES GRAPHIC LETTERS

You can write and PRINT graphic-generated letters on the two-color graphic screens with *THE SOLUTION* (Snake Mountain Software, P.O. Box 5722, Raleigh, NC, 27650, $12.95).

The name of this machine language program is taken from a desire on the part of some to have a four-line window at the bottom of the screen for words, something like an Apple computer. One of the options is for a four-line scroll at the bottom, leaving the remainder of the screen for true graphics. But, it also takes advantage of the power of the 80C and can print letters and words anywhere on the graphic page.

The display is 42 characters by 21 lines and you can have graphic text and characters on the screen at the same time. There is both an upper and lower case with descenders and the program interfaces directly with BASIC.

Its a nice program which could benefit greatly from better and more detailed instructions. This program works and is a good implementation of an idea. We wish that just *how* it provides *THE SOLUTION* were a bit easier to get at.

There is also one problem of incompatability between the program and BASIC's ROM, but the fix is easily made and is explained in detail.

Software Review...

THIS SPACE INVADERS IS A GOOD ONE

SPACE INVADERS (by Space Cadet Enterprises, 523 Big Ridge #5, Biloxi, MS, 39532, $26 cassette, $29 disk, $5 discount for cashier's check or money order) is so much like the arcade game that I'm hard pressed to tell them apart. Its in the 256x192 graphics mode with four colors (black, red, blue and white) and has very good sound.

There are 500 speed levels to this game. This gives a lot of variety and easy adjustment to individual tastes and abilities. The first speed setting is very slow, more suited for young children than adults (200 or below are best suited for younger kids). Most arcade games run too fast for children and the ability to slow the game down is a real plus with kids in the house.

The play on the 500 level is blinding and just the thing for someone with overabundant skill and/or confidence.

On any speed level, there are three speed settings for the bombs. You can raise or lower their speed without changing the overall speed of the game. Too, there are normally three bombs on the screen at a time, but this can be changed to anywhere from 1 to 20. The more bombs there are, the slower they fall and the speed adjustment helps a lot with this.

SPACE INVADERS by Space Cadet needs 16K of memory and will run with either extended or non-extended basic. It is in machine language. Joysticks are not required. My game had an error in it, but Space Cadet fixed it and had a new, error-free version out to me in a week.

There are a lot of invader games on the market, and I can't say if this one is any better than them -- but they'd be hard pressed to keep up with this exciting game.

-- Charles Blakeney

(EDITOR'S NOTE: We took a look at this game independently, and it is one of the best! Very versatile and a great deal of fun to play. We recommend it highly.)



"OH C'MON FRED, I HAVEN'T BEEN USING THE COLOR COMPUTER THAT LONG!"

Software Review...

DATE-O-BASE CALENDAR WORKS WELL

If you are one of those people who just *has* to keep track of your time or can't remember a birthday or anniversary date for the life of you, then *DATE-O-BASE CALENDAR* is the answer to many of your problems.

This excellent program (from Custom Software Engineering, 807 Minuteman Causeway, Cocoa Beach, FL, 32931, $16.95 tape, $19.95 disk) is a general calendar and date pad system.

You can place up to 12 short memos in any given date between the years 1700 and 2099. They could be "Wife's 30th Birthday" on the appropriate date or "Pay Mortgage" on the first of every month. Once you have these memos input, the program will store them on tape or disk and you can recall them at will.

You *also* have the option of searching any series of dates for either all messages or for messages of a specific type. This search is fast (especially on the disk version) and totally accurate. By using it, you can call up all birthdays in a year simply by using a key word like "birthday" or you can code in bill-paying needs by recording them with some sort of code like "$-". Of course, if you start each bill entry with the word "pay," you can simply use that as a keyword.

Just as simply, you can delete memos and, because you can specify which memo position on the screen an individual memo should be located, you can -- if you wish -- allocate the first six slots for morning memos and the last six for afternoon and evening memos.

As a bonus, the *DATE-O-BASE CALENDAR* also does days between dates computations. Moreover, it gives elapsed time in days, days and weeks, months and days and years, months and days. The days and days and weeks automatically account for leap years.

Finally, the program will display an entire month on the graphic screen (which you can print out with a screen print program). And, it alerts you to a particular day which has a memo in it with a marker and a tone.

This offering, which requires 32K and Extended Color Basic, is a first class program.

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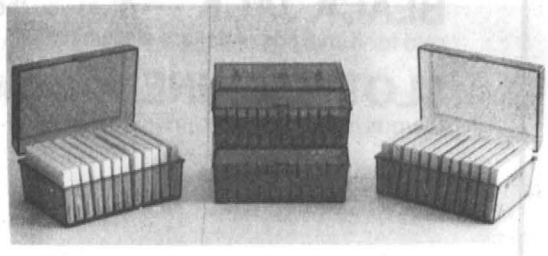
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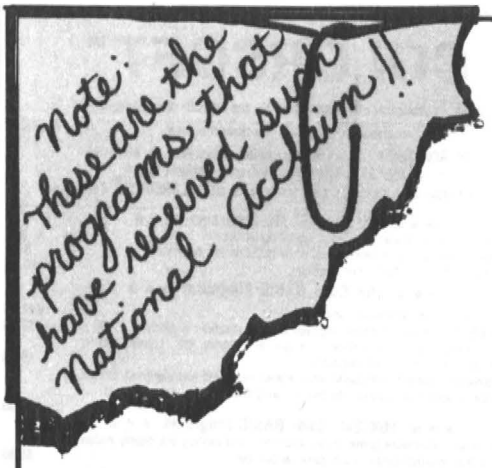
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Software Review...

THESE THREE WILL LET 80C "TALK"

Ever since we listened to HAL in *2001 - A Space Odessy*, we've been fascinated by talking computers. And your 80C can talk with the best of them, as evidenced by three unique programs available from Star-Kits and Spectral Associates (details below).

COMPUVOICE is a synthesizer that allows you to type in letter combinations called phonemes, which tell the 80C how to pronounce words. *SOUNDSOURCE* makes it possible for you to load sounds directly into memory and have them play back. You can also modify the sounds. *NEWTALK* will "read" the contents of memory locations to you so that you can check the accuracy of machine language program listings. Star-Kits makes *NEWTALK*, the two others are available from Spectral. All are in machine language.

The *COMPUVOICE* program allows you to program words into 80C using letter and symbol combinations. A list of them is supplied. For example, if you want to have the computer speak the word "eight" to you, you set up a string with the letter combination "AAYT." In all, there are 35 phonemes, ranging from a simple "B" to some complicated sounds such as the "NG" sound in "think." There are also stops and modifiers, in addition to the phonemes.

The sounds are set up as strings and can be executed as part of a BASIC program. This -- like all the other programs reviewed here -- is *not* tape recorded sound played through the speaker, it is actual computer-generated sound.

COMPUVOICE does take some getting-used-to. It requires you to think about words in terms of how they sound rather than how they are spelled. Once your mind makes this conversion (and there are some pages of documentation to help), the sound is a pretty fair approximation of human speech. The mating of the machine language program and a BASIC program which will use the sounds is easily accomplished and clearly explained.

SOUNDSOURCE will allow you to load any sound in from your tape recorder using a special (supplied) cable which runs from the recorder to the right joystick port. The program takes this sound, converts it to digital code, and then allows it to be played back. In addition, you can modify the sound with your joystick and you can also see a graphic representation of the sound on the screen.

Like the other programs, this is not taped sound, but computer generated sound. I ran a test in with my voice and was amazed to hear it come back out from the 80C's memory. And, using one of the program's functions, I even played my voice back backwards -- since it is reduced to digital information, it is easy to do.

SOUNDSOURCE allows you to modify sounds and to save them as well. You can also shift them in memory, repeat them, and play them backwards. With all this capability, it is an excellent way to experiment with computer sound. You can create almost any noise you like.

It is especially interesting to see the sound waves on the screen. This will give you some ideas of what the sounds look like and how they might be changed to achieve the specific sound you want.

NEWTALK solves a problem that plagues us all. It will "tell" you what is in a specific memory location. No more asking someone to help proofread your machine language listings, this one does it for you.

The "proofing" is done in hexidecimal. If you tell *NEWTALK* to start at memory location 600 (hex) it will "say" "4C" or something to that effect. The voice is extremely clear and understandable.

Hitting a comma makes *NEWTALK* say the memory address and the contents. Hitting a period gives you just the contents. Hit another comma (or period) and it moves to the next address.

If you are one of those people who needs someone to help you proofread machine language listings for accuracy, this is a perfect program for you. And, as with Star-Kits' *HUMBUG* program, the documentation is excellent.

COMPUVOICE, Spectral Associates, P.O. Box 99715, Tacoma, WA, 98499, $44.95.

SOUNDSOURCE, Spectral Associates, $24.95.

NEWTALK, Star-Kits, P.O. Box 209, Mt. Kisco, NY, 10549, $20.

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First of a Series...

80C PICKS THE NATIONAL FOOTBALL LEAGUE

16K ECB



by John Waclo

It's time for NFL FOOTBALL! Is it really? Well if you're a football nut and you enjoy using your Color Computer, it's time to get ready for the 1982 NFL season.

Starting with this issue, I begin a three-part series on the NFL. Last year we spent the entire NFL season using our 80C to watch the teams. During the next three months we'll tell you what we learned and provide the program listings so you can try it yourself.

At one point last year we had three, 32K, 80C's analyzing data every single week. Even if you're not interested in the programming, you'll find the results fascinating. Why? Because we tried to predict the outcome of future games. The software even took into account the "point spread".

In Part I of this series we'll talk about what we learned from last season and we'll get your 80C into the NFL with a program listing that will generate a week-by-week schedule for the 1982 NFL games. In addition to being informative, the output from that program will be used to collect data for *The NFL Report* program.

Part II will present our program that generates *The NFL Report*, how to read it, how to enter data, and how it works. This report contains 32 pages of summarized team data, and is updated each week of the season. We've included the San Francisco 49er's team summary, from this report, for your review in this article.

Finally, Part III will discuss what we found as a result of closely watching each team's performance. From last year, we learned the NFL season plays like a chess game. It has an Opening, Mid-game, and End-game. Each has to be treated differently. See if you agree with our predictions and trends in Part III.

So much for an overview, let's get on with Part I.

The NFL season is 224 games, played by 28 teams in a time period of 16 weeks. It's all run by the National Football League, 410 Park Avenue, New York, (212)758-1500; nice folks. This year's season starts on September 12 and we spin the team-wheel every weekend thereafter.

GIVE ME SOME OVERALL FACTS ABOUT LAST YEAR?

During last year's season we generated over 700 pages of printout while watching the progress of each team. Let's start with a little "cocktail knowledge" and some averages.

The next time you're at a party you can ask the question, "How many total points were scored in the entire '81 NFL season?". The correct answer is 9,282. When you have a computer plowing through home teams, away teams, point spreads, favorites, underdogs, and team power factors, you might as well have have it calculate totals like this.

On the surface the total points scored in a given season appears totally useless, and it is. However, since we also know there are 224 games, and two teams in every game (in some games I have my doubts), the total points scored in an *average*, 1981, NFL game was 42; (21/team). Just think about that for a minute. That's a total of 6 touchdowns per game. It really looks like the recent rule changes have opened up the scoring.

WHAT WAS THE SCORE FOR AN "AVERAGE" NFL GAME?

The average score in 1981 was 27-14. Here's the important fact you need in order to calculate that number. The average *point difference* per game last year was 11.8. That really yields a game score of 27-15, but since 15 is hard to come by we made it 27-14.

DOES THE HOME TEAM REALLY WIN MORE OFTEN?

Yes it does. After keeping data on all the games played in 1981, we can say with accuracy that the home team won 62% of all games played. From this statistic it would appear the home team has a small, but definite, advantage.

DOES THE HOME TEAM HAVE AN ADVANTAGE WHEN YOU CONSIDER THE POINT SPREAD?

Yes, but it's very small. Again, for all games played last year, the home team won 54% of the time when you include the point spread. It looks like the people who establish the point spread are also aware of the home team winning percentage. Using the spread, they've done a good job of neutralizing the home team advantage.

For those readers who are not familiar with a point spread, or "line" as it's sometimes called, it's a small number of points assigned to one team, before the game, in an attempt to make the final score more even. When you include the point spread, you are talking a closer game.

You don't have to go to Las Vagas to find the point spread either. The NFL point spread is available in most major city newspapers under the syndicated column "The Latest Line". For the purpose of our data collection we used the "line" as published on Tuesday morning. The day after Monday Night Football.

WHEN YOU INCLUDE THE POINT SPREAD, HOW OFTEN DOES IT REVERSE THE OUTCOME OF THE GAME?

Not very often, or should I say just enough times to make things really interesting. Take your pick. Actually, through the first 14 weeks of last season, the line only changed the winner in 21 games. That's an average of less than two games each weekend, or 10.7% of all games played.

Notice that I omitted the last two weeks of the season when I calculated the answer to this question. There's a valid reason for this. As the teams approached the playoffs, some games become meaningless because neither team had a chance for post season play. In most of these cases a line was not established. Since this would influence the statistic we're after, the last two weeks were dropped from our calculations.

HOW MANY TIMES DID THE POINT SPREAD MAKE THE GAME END IN A TIE?

For all 224 games played, only two ended in a tie when you include the spread. So the next time you're looking at a 3 point spread, and you're wondering if the other team will kick a field goal to end the game in a tie, you have the odds in your favor. It only happened in 0.9% of all games played last year. Of course that dosen't provide much consolation for the folks in the 0.9% category.

FOR MONDAY NIGHT FOOTBALL, DOES THE HOME TEAM HAVE A SIGNIFICANT ADVANTAGE?

(Continued on next page)

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NFL (From Page 13)

Last year's numbers heavily favor the home team. I'm not sure if that's always the case, but the final results are interesting.

When you only consider Monday Night Football, the home team won 75% of all games. Said another way, the home team won 3 out of every 4 games played. Even when you include the point spread, the home team still won 62% of all the Monday night games.

Twice last season, the addition of the point spread reversed the winner of Monday Night Football. On both occasions the home team won the game, but the away team won when you included the spread.

Monday Night Football has become a real media event. Just look at its acceptance by the public and watch the enthusiasm of the home town fans. Apparently this does have a significant impact because the home team is winning more often. In any case, it's a number worth watching in the '82 season.

WHO WINS MORE OFTEN, FAVORITES OR UNDERDOGS?

The correct answer is both and neither. I'll explain myself after we define these new terms.

We mentioned before, the point spread is some number of points given to one team, before the game begins, in an attempt to make the final outcome more even. The team which receives the points is called the *underdog*. The other team is called the *favorite*.

Don't draw the conclusion that the underdog is the poorer team just because it received points. It's intuitive to feel that way, but it's wrong. Many factors are involved in establishing which team will receive points, and which will not. Items like player injuries, home field weather conditions, and the won/lost record between the teams in previous meetings, all play a significant part in establishing the line for a given game.

Getting back to the main question, the answer comes in two parts. Through week 14 of the season (196 games), the underdog won 51% of all games, favorites won 43%, and the remainder were ties or "even" games with no line. Again, the last two weeks of the season were omitted because some team pairings were not given a line. These teams had no hope

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Auto Run

Auto Run is a utility program for the TRS-80* Extended Basic Color Computer. It is used to add convenience and professionalism to your software.

Auto Run will create a tape which will consist of a machine language loader followed by your basic or machine language program. With this tape, a simple CLOADM command will load and start the loader which will then load and start your program.

You may design a title screen with the graphics editor which will display as your program loads. Also, you may record a vocal or musical introduction preceding your program. The Auto Run loader will control the audio on/off.

Basic programs can be set to load anywhere in memory above &600 (the PCLEAR 0 page).

Software authors: The Auto Run prefix may be appended to your software products.

Auto Run is $14.95 and includes complete documentation and an assembly source listing.

Ohioans add 5.5% sales tax.
Add $1.00 per tape for postage and handling.
C.O.D. orders are welcome.
Dealer inquiries invited.

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Reynoldsburg, Oh 43068
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*TRS-80 is a tradeamrk of Tandy Corp.

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for a playoff possibility.

These statistics would seem to indicate that neither favorites nor underdogs have a real advantage. True, last year more underdogs won, but it's so close that it could change from year-to-year.

On the other hand, when you look at the season week-by-week, a different story begins to imerge. This story says both favorites and underdogs win during different parts of the season. I think this theory has credibility.

Basically, we know from looking at Monday Night Football performance, the home team appears to have a real advantage. It looks like the home team, and fans, play the same part during the *beginning* of the season.

After the first three weeks of last season, favorites had won 54% of the games; underdogs 38%. Clearly favorites seem to dominate the early part of the season. The next nine weeks (week 4 thru 12) saw the favorites only win 39% of all games played. The underdogs won more games for the rest of the season. It looks like the old saying, "Take the points and go with the underdog", might have some merit. Especially after week three.

DO HOME-TEAM-FAVORITIES WIN WITH A HIGH PERCENTAGE?

If you consider all of last season, they were a little less than even; 46% for the year. However home team favorites were dynamite at the beginning of the season. For the first three weeks of last year they won a excellent 60% of all games played. Even the few away-favorites did well during the early weeks, winning 75% of the time. However, away favorites finished with only an overall 42% win percentage.

HOW DO YOU CALCULATE THE RELATIVE POWER OF A TEAM?

If you're going to try to predict future game winners, you must have a way to give each team a *power factor.* One thing we learned from last season is don't get carried away with complicated analytical expressions. We tried different approaches, in parallel, using more than one 80C and the simple techniques seemed to work best. The equation we're using now takes into account each team's wins, total points scored, and the total points allowed.

USING YOUR APPROACH, WHICH TEAMS HAVE THE MOST POWER IN THE NFL?

There's no big surprise here. Our model confirmed reality. The big power teams today are:

-San Francisco +20
-Cincinnati +19
-Philadelphia +19
-Dallas +18

WHICH TEAMS HAVE THE LEAST POWER?

Just as our model confirmed the most powerful teams, it also did a good job at the other end of the scale.

-Cleveland - 1
-New England - 1
-New Orleans - 7
-Baltimore -15

WHEN YOU INCLUDE THE SPREAD, WHICH TEAMS WERE THE BIG WINNERS AND LOOSERS LAST YEAR?

Here are the top three and bottom three teams when you consider the spread:

-Cincinnati	12- 4
-Miami	12- 4
-San Francisco	12- 4
-New Orleans	6-10
-Baltimore	4-12
-New England	3-13

By now you can see there are many ways to look at last year's NFL data for analysis. We could go on for quite awhile but that's not the entire purpose of this article.

If you think collecting information like this would be fun, and it would make every game in the NFL more interesting, then it's time to get *your* 80C into the NFL with our first program.

On April 8th the NFL released the 1982 National Football League schedule. I was under the impression these games were scheduled years in advance. They're not. In fact we had to work hard to get the schedule in this issue. Here it is! Only three weeks old, and already in *RAINBOW.*

If you load the listed program it will produce the schedule of games for any week you choose. The program is configured for an Epson MX-80 printer. However, it can be easily modified for most popular printers. Change line 110 for your Baud rate. You must also have at least 16K and Extended Basic to use this listing.

Run the program and it will ask

(Continued on next page)

NFL(From Page 15)

"which week's" schedule you desire. Enter your week of interest and the program will tell you to <ENTER> when the printer is ready. After that it will print the desired schedule.

IMPORTANT NOTE! At the pause... "hit <ENTER> when the printer is ready", if you enter the *code* "77 <ENTER>" the program will produce weekly schedules starting from the week you entered, to the end of the season. Therefore, if you want to see the entire '82 weekly schedule... enter "1" for the week of interest and the code "77" to finish the year.

The schedules which are generated clearly show the home and away teams for that week. On either side of the teams you'll see a capital "G" and "S". This stands for Game and Spread. If you want to try and guess winners for that week, just *circle* the appropriate "G" and "S" for the teams you think will win the Game and Spread.

The numbers at the top of the schedule indicate the number of games played to that week. There is a space to the left of each number for you to keep track of how many you've guessed correct. There are also numbers at the bottom of the schedule for you to total you're results for that week.

We'll talk more about the main program, *The NFL Report*, in the next issue (you'll need 32K to run it). It's the program that produced the team summary you see in this issue. Data that you collect on these schedule sheets will be used by the *Report* program so get this one running by next issue.

(NOTES: The baud rate is set in line 110. If you have a standard printer with a set baud rate, you should change this line to REM. Lines 420, 440 and 490 use CHR$(14) to go to the double-wide characters. If you do not have an NX-80, your code may be different to go to doublewide. You may also have to turn off the doublewide characters in those lines, using your own printer controls. The NX-80 turns the doublewide characters off automatically with a linefeed.)

```
10 '****NFL SCHEDULES****
20 'REV 4/19/82; (C) 1982,
30 'JOHN WACLO
40 'BOX 11224
50 'PITTSBURGH, PA  15238
60 CLS3:PRINT"  ***NFL FOOTBALL
SCHEDULES***"
70 PRINTSTRING$(32,"=");:PRINT
80 INPUT"SCHEDULE FOR WHICH WEEK
";W:IF W<1 OR W>16THEN80
90 R2$=CHR$(10):R1$="":DIMT$(28)
,G(448)
100 PRINT:PRINT"WHEN PRINTER IS
READY...":INPUT"PRESS <ENTER>";H
110 POKE150,18:POKE155,80
120 T$(1)="PITTSBURGH STEELERS"
130 T$(2)="CLEVELAND BROWNS"
140 T$(3)="HOUSTON OILERS"
150 T$(4)="CINCINNATI BENGALS"
160 T$(5)="BUFFALO BILLS"
170 T$(6)="MIAMI DOLPHINS"
180 T$(7)="NEW ENGLAND PATROITS"
190 T$(8)="NEW YORK JETS"
200 T$(9)="BALTIMORE COLTS"
210 T$(10)="SAN DIEGO CHARGERS"
220 T$(11)="OAKLAND RAIDERS"
230 T$(12)="KANSAS CITY CHIEFS"
240 T$(13)="DENVER BRONCOS"
250 T$(14)="SEATTLE SEAHAWKS"
260 T$(15)="DALLAS COWBOYS"
270 T$(16)="PHILADELPHIA EAGLES"
280 T$(17)="WASHINGTON REDSKINS"
290 T$(18)="ST. LOUIS CARDINALS"
300 T$(19)="NEW YORK GIANTS"
310 T$(20)="MINNESOTA VIKINGS"
320 T$(21)="DETROIT LIONS"
330 T$(22)="TAMPA BAY BUCCANEERS
"
340 T$(23)="CHICAGO BEARS"
350 T$(24)="GREEN BAY PACKERS"
360 T$(25)="ATLANTA FALCONS"
370 T$(26)="LOS ANGELES RAMS"
380 T$(27)="SAN FRANCISCO 49ERS"
390 T$(28)="NEW ORLEANS SAINTS"
400 FOR Y=1TO448:READ G(Y):NEXT
410 FOR Y=((W-1)*28+1)TO((W-1)*2
8+28):CS=CS+G(Y):NEXT:IF CS<>406
THENPRINT"DATA ERROR IN WEEK";W:
END
420 PRINT#-2,R2$;R2$;R2$:PRINT#-
2,TAB(17)CHR$(14)"** GAMES FOR W
EEK ";W;"**";R2$;R2$
430 PRINT#-2,TAB(10)"GAME";TAB(3
6)"SPREAD";TAB(62)"MONEY";R2$
440 PRINT#-2,TAB(12)CHR$(14)"/";
14*(W-1);TAB(26)"/";14*(W-1);TAB
(39)"/";3*(W-1);R2$;R2$;R2$
450 PRINT#-2,TAB(18)"AWAY TEAMS"
;TAB(52)"HOME TEAMS";R2$
460 FOR Y=((W-1)*28+1)TO((W-1)*2
8+27)STEP 2
470 PRINT#-2,TAB(7)"G";TAB(12)"S
";TAB(17)T$(G(Y));TAB(38)" VS ";
TAB(44)T$(G(Y+1));TAB(67)"G";TAB
(72)"S";R2$
480 NEXT
490 PRINT#-2,R2$;R2$:PRINT#-2,TA
B(12)CHR$(14)"/";14*(W);TAB(26)"
/";14*(W);TAB(39)"/";3*(W);CHR$(
12)
500 IF H<>77THEN CS=0:GOTO60
510 IF W=16 THEN END ELSE W=W+1:
CS=0:GOTO410
520 DATA 25,19,23,21,2,14,3,4,12
,5,26,24,6,8,7,9,11,27,18,28,10,
13,22,20,17,16,1,15
```

```
530 DATA 20,5,9,6,4,1,15,18,21,2
6,28,23,8,7,11,25,16,2,10,12,27,
13,14,3,17,22,24,19
540 DATA 25,12,5,3,23,27,15,20,1
3,28,26,16,6,24,19,1,8,9,11,10,1
8,17,14,7,22,21,4,2
550 DATA 9,21,2,17,3,8,12,14,26,
18,6,4,20,23,7,5,28,11,19,15,16,
24,1,13,10,25,27,22
560 DATA 25,26,5,9,4,7,2,11,13,8
,21,6,24,23,3,12,20,22,18,19,27,
28,14,10,17,15,16,1
570 DATA 25,21,9,2,23,18,4,19,15
,16,13,3,12,10,26,27,7,6,28,20,1
1,14,1,17,22,24,5,8
580 DATA 2,1,15,4,21,5,24,20,6,9
,28,26,8,12,11,13,18,7,10,14,27,
25,22,23,17,3,19,16
590 DATA 25,28,5,13,23,24,15,19,
3,2,26,10,6,11,7,8,16,18,1,4,27,
17,14,12,22,9,21,20
600 DATA 25,23,9,7,13,14,21,16,2
4,22,3,1,12,11,26,28,20,27,19,2,
8,5,18,15,17,4,10,6
610 DATA 5,7,23,22,4,3,2,6,15,27
,13,12,24,21,20,17,28,10,19,26,8
,1,11,9,14,18,16,25
620 DATA 9,8,4,16,21,23,12,28,26
,25,6,5,20,24,7,2,1,3,27,18,14,1
3,22,15,17,19,10,11
630 DATA 2,15,19,21,9,5,23,20,13
,10,24,8,3,7,12,26,28,27,11,4,16
,17,1,14,18,25,6,22
640 DATA 27,26,25,13,5,24,4,9,15
,17,3,19,12,1,20,6,7,23,18,16,10
,2,14,11,22,28,8,21
650 DATA 16,19,10,27,9,20,23,14,
2,4,13,26,21,24,6,7,28,25,11,12,
1,5,22,8,17,18,15,3
660 DATA 26,11,8,6,25,27,5,22,24
,9,3,16,12,13,20,21,7,14,28,15,1
9,17,1,2,18,23,4,10
670 DATA 9,10,23,26,2,3,13,11,21
,22,24,25,7,1,19,18,8,20,16,15,2
7,12,14,4,17,28,5,6
```

Team Summary Next Page)

Software Review...

FLIGHT SIMULATOR NEEDSLOTS OF HELP

3-D RED BARON FLIGHT SIMULATOR doesn't really get off the ground as far as a quality program is concerned.

Sold by Seebree's Computing (456 Granite Ave., Monrovia, CA, 91016, $16.95), this program does have some good graphics and, well, some potential.

But that is about all. You can get "up in the air" with it, although responses are somewhat sluggish. Once you are, you cannot "fly" anywhere, *per se*, instead, all of a sudden it is time to land.

Save your money.

R.S. COLOR DISK SYSTEM SOFTWARE

DISK EDITOR/ASSEMBLER - This package includes a full featured disk based text editor program and a disk to disk/tape/memory assembler. The text editor is an easy to learn full featured editor which allows files larger than memory to be created and edited with ease. It is compatible with ASCII formatted tape & disk files to allow easy conversion of tape based programs. The assembler supports the full 6809 processor instruction set and will cross assemble 6800 code to 6809 object code. The output object file can be directed to either disk, tape or memory with overwrite protection. The object listing can be output to the screen or printer and versions for printers with or without line feeds are provided. DISK EDITOR & ASSEMBLER $79.95

DISK TERMINAL PACKAGE - A disk based Terminal program for your color computer features full text buffering, baud rates from 300 to 9600 baud, programable word length, parity bits odd/even/none, stop bits. The buffer size is automatically set to the maximum size of your memory. Full control codes can be sent, display word wrap is automatic. The text buffer can be saved or loaded from/to tape or disk. The contents of the buffer can be sent as a file with automatic re-entry to terminal mode, also a file can be sent directly from disk to another user. The contents of the buffer can be displayed on the screen or optionally be output to a printer plugged into the RS 232 port. All file formats are directly compatible with our text editor and word processor programs. DISK TERMINAL PACKAGE $49.95

TEXTPRO I DISK TEXT EDITOR/WORD PROCESSOR - is a complete word processing system designed for easy learning and use. It features a disk based text editor for editing files larger than memory and direct processing of text files from disk or memory. Some of the editor commands include: copy, move, search, replace, delete, line & automatic edit modes allow easy logical commands to add, change, insert, delete, skip up/down line, ignore changes made on last line, skip to begin/end of line all with easy single keystroke commands using arrow keys. The editor can also load, save and append tape or disk files for easy conversion of existing ASCII text files. The Word Processor includes over 29 commands for formatting the output, some of them include: page length, page mode on/off, page numbers on/off, left margin, top/bottom margin, line length, center, double width print, single, multiple & special indent, test lines left on page, skip to top of page, send control codes & ascii data for special printer control, justify on/off, page heading, multiple footnotes per page, word fill mode on/off, send message to screen, display & input from keyboard and more. This is an excellent word processor with many advanced features and one of the easiest to learn and use in just minutes. All commands are logically oriented in easy to remember and associate 2 character commands. DISK TEXTPRO I $49.95

TEXTPRO II TEXT EDITOR/ WORD PROCESSOR - Includes all the features of TEXTPRO I plus: 10 programable tab stops, can be used with horizontal tab to next location, center over tab column, decimal allignment on tab column, right justify to tab column, tab to programed column. Also tab commands can use specific values for tab columns or programmed values. Other additions include: character fill, right justify line, programable footer can be centered/right justified/double width or almost any processor commands can be used with it, 3 programable header lines, expanded footnotes and processable keyboard input data during word processing. DISK TEXTPRO II $79.95

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The East Texas Color Computer Club
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after week 16

SAN FRANCISCO 49ERS

NFC WEST # 1

NFL Ranking: 1
SPREAD Ranking: 1 T

	WON	LOST	TIED	
Record:	13	3	0	
	12	4	0	with spread
At Home:	7	1	0	
	7	1	0	with spread

Games played:

L	W	L	W	W	W	W	W	W	W	L	W	W	W	W	W	
L	W	L	W	W	W	W	W	W	W	L	W	W	W	W	L	spr
5U	2F	10U	6F	2U	5U	0E	0E	5U	2U	4F	3U	5F	7U	8F	7F	

Last 3 games:

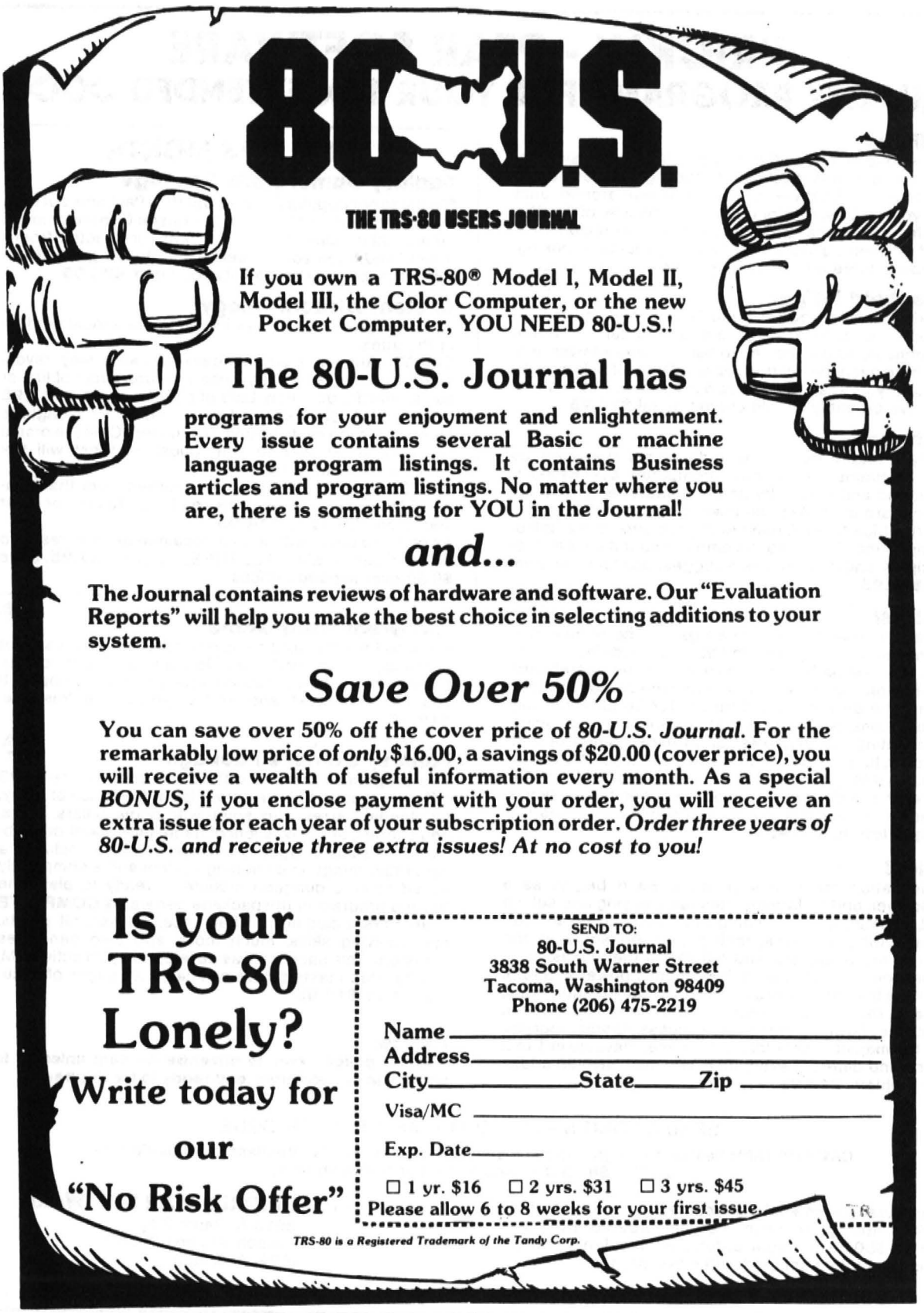
Offense is scoring 23 points/game
Defense is giving up 9 points/game
Average score difference is +15 points/game

Total Season:

Offense is scoring 22 points/game
Defense is giving up 16 points/game
Average score difference is +7 points/game

TEAM POWER FACTOR IS: +20

WON	LOST	TIED	SCORE
	DETROIT LIONS		A 17-24
CHICAGO BEARS			H 28-17
	ATLANTA FALCONS		A 17-34
NEW ORLEANS SAINTS			H 21-14
WASHINGTON REDSKINS			A 30-17
DALLAS COWBOYS			H 45-14
GREEN BAY PACKERS			A 13- 3
LOS ANGELES RAMS			H 20-17
PITTSBURGH STEELERS			A 17-14
ATLANTA FALCONS			H 17-14
	CLEVELAND BROWNS		H 12-15
LOS ANGELES RAMS			A 33-31
NEW YORK GIANTS			H 17-10
CINCINNATI BENGALS			A 21- 3
HOUSTON OILERS			H 28- 6
NEW ORLEANS SAINTS			A 21-17



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Actually five programs from one CLOAD, and you choose the one you want from the menu. You can do Metric conversions, adjust recipes to serve more or fewer people, figure gasoline costs, keep a data file of bills coming due, and you even get a stopwatch/timer. Full instructions. We probably should charge more! **$14.95**

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Finally! A totally flexible, menu-driven set of elementary math programs for the color computer! **MATHPAC I,** developed and tested by an elementary teacher in his own classroom, allows the user to chose the operation (+−*/), difficulty level, number of problems, and a drill or testing format. This program employs sound educational principles, and even includes suggestions for classroom use. **$19.95**

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A strategy version of America's game. The offense and defense enter their plays, and the results (different each time) are calculated and displayed on the scoreboard. Will they run up the middle or throw the bomb? Are they playing the prevent, or will they blitz? 36 different play combinations provide over 200 possible play outcomes, not counting the variables for yardage gained or lost. Intercept, fumble, blitz, punt, and kick field goals. Even an occasional long run or punt return for a touchdown!. Be aware, this isn't another arcade wonder to see who's faster on the joystick, but all you sideline coaches are going to love it. **$16.95**

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A simulation for 1 to 4 persons. Each begins as a landowner, and by farming their land, buying and selling land, expanding their fishing fleet, building on to their manufactory, increasing their population, equiping and training more soldiers, and regulating their taxes, each player tries to increase their economic power and rank until one becomes ruler over all. But beware plagues, rats, raiders, revolts, bad weather, and other misfortunes which may lie along the road to success. As you progress, see the map of your holdings increase. Playable in 1 to 2 hours, and different every time, you may have an addiction problem. **$19.95**

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I CHING A Chinese wisdom so old its very origin is shrouded in the mists of time. The ancient Chinese oracle will give an answer to your question. What will the hexagram reveal? **$16.95**
NUMEROLOGY What can be learned from the numbers? Do a character analysis, read your destiny, or chart your monthly cycles. **$14.95**
All of these come with ample documentation — ready to be used immediately. ALL THREE for just **$39.95.** Save $9.90 over separate prices.

The Great Word Game
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Special Feature...

PRINTERS: AN OVERVIEW OF SOME FEATURES

By Lawrence C. Falk

Printers seem to be the most widely wished-for and, yet, most misunderstood thing you can attach to your 80C.

By far the most common subject of letters to *the RAINBOW* is the printer -- ranging from comments about a specific printer to questions (and questions and questions!) concerning how printers work, why they don't work and so on.

We're looking at this Special Feature to be a part of *the RAINBOW* on a fairly regular basis. Sometimes I'll write it (I'm *into* printers), and sometimes we'll let another person do the honors. We'll also ask for some cooperation from some of the printer manufacturers for some in-depth looks at the most common printers which can be attached to the 80C.

Judging from our correspondence, the most misunderstood thing about any printer is how to get all the goodies that the printer manual may specify you can use with a particular model. These frustrations seem to run the gamut from "special" character sets to dot matrix graphics. There is also a lot of confusion about how you "make" a printer do such-and-such. We'll try to clear up both of these things this month.

We've got to get a little technical to explain. First of all, there are, essentially, two kinds of printers -- intelligent and not-so-intelligent. The Line Printer VIII, the Epson MX-80, and the Microline 83A are examples of intelligent printers. The Line Printer VII is non-intelligent.

When we say a printer is intelligent, we mean that it has its own chips that translate signals and tell it what to do. It may, however, do some internal things with those chips as well -- such as count lines for a top of form (to roll the paper up to the top of a new sheet). Printers like the LP VIII and the MX-80 have a whole range of things they can do. A printer like the LP VII cannot do much more than print in regular and double-wide characters.

Oops. Before you take me to task on that one, I know that the LP VII has dot-addressable capabilities. And, for the price, they make it one of the best printers on the market.

But LP VII is not really intelligent in the sense of some of the others which are available. For the purposes of this, however, all of that is beside the point (we'll talk about differences in printers in more detail another time).

What you have to know right now is that *most* of these printers -- from the smartest to the less-than-Einstein's -- all receive a signal from the computer telling them to print something. And, all this -- as is most everything the computer does -- is in the form of binary numbers. You know, those 1's and 0's that are a computer's "native" language.

There are only a limited number of ways to combine 1's and 0's. And, if you are using just seven of them, that limit comes after 127. Look on pages 184-187 of *Going Ahead...* and you will see that the binary number for 0 is the same in the last seven places as the binary number for 128.

With the 1.0 ROM in the 80C, the computer only sends seven bits to the printer. So, if you tell 80C to send a code to print a British pound-sign (decimal 193) to the printer (by typing PRINT #-2, CHR$(193)), your printer will happily comply and print out an "A". But, an "A" is decimal 65, right? Right. Now look at the binary numbers. If you ignore the leading bit, the "A" and the Pound symbol are the same.

Since the 80C with the 1.0 ROM only sends seven bits, there is no eighth bit. That means the printer doesn't know which one you mean and, being confused, figures anything it does not see isn't there. That means it interprets the "nothing there" for a 0, and you get an "A".

Yes, the Pound symbol is "in" the printer, but the 80C isn't telling it to print it.

But you can, *yes you can*, solve this problem. Radio Shack has a program called an eight-bit driver which will add that eighth bit to the code the 80C sends to the printer. And, even better, it is free! Just ask for the PTFX program. (By the

(Continued on next page)

PRINTERS (From Page 21)

way, the Radio Shack SCREEN PRINT program has its own eight-bit driver.)

Once you load the eight-bit driver into the 80C (it is in machine language), you will send eight bits to the printer. Send a CHR$(193) and, if you have a LP VIII, you'll get a Pound symbol.

Ah, but now...how do I get my MX-80 to print out dot graphics like the screen print routines I see in *the RAINBOW*?

The answer is that you don't. Not with the Radio Shack SCREEN PRINT program, anyway. Because, in addition to using the eight bits, the LP VII and LP VIII have different codes telling them to go into dot graphics than does, say, the MX-80.

The Radio Shack SCREEN PRINT program will work fine on a Radio Shack printer. But the commands are not the same for another printer and it won't work.

By way of illustration, try sitting down to an inferior computer -- such as, say, an Apple II -- and typing in some sort of command like LINE (28,32)-(133,77),PSET. Doesn't work, does it? That is because the LINE command isn't part of the Apple's BASIC vocabulary. And, the instructions which tell the LP VII and LP VIII to print graphics are not part of the MX-80's vocabulary, either.

With an eight-bit driver, you can do dot addressable graphics with the MX-80. But, you will have to program it by hand (at least, until someone writes a program to do it for you).

By the by, the 1.1 ROM does put out eight bits, so you don't need a driver.

Finally, remember that both the LP VII and the LP VIII can be switch-selected to be eight or seven bit machines. You have to have the switch set to the proper place before you can send eight bits.

And, for that matter, both will receive either serial or parallel signals -- while the MX-80, off the shelf, is a parallel-only printer. The 80C sends serial signals to a printer.

With the MX-80 (and other printers that are "parallel only"), you can overcome the problem in two ways. One is to buy a special board from the printer manufacturer (many computer stores which carry 80C products can either stock or get these) or you can buy a converter that will change the serial signals from your 80C to parallel. Both the Microworks and Micro Labs carry these converters.



Software Review...

FOOTBALL! USES STRATEGY FOR PLAY

There are two ways to play football (other than going out on a field, straining muscles and hurting yourself, of course). One of them is an arcade-style program with little figures running around and the other is to do some planning and thinking.

FOOTBALL! (Prickly-Pear Software, 3518 S. Randi Place, Tucson, AZ, 85730, $16.95) is a strategy-type game. There are no graphics at all (but there is music). It is easy to play, keeps both sides interested and moves fast enough that there is plenty to do.

The program is a simulation that attempts to duplicate how a real play might come out if the circumstances were the same on the field. Obviously, there are some random considerations involved, but your chances of completing a long pass are considerably longer than your chances of completing a short pass. And, if the defense has a blitz on, there is always the oppportunity for trouble if you are passing.

On the other hand, if there's a blitz going and your choice is a delay, things could work out very well.

Both the offense and defense have the opportunity to choose their plans before the play. This has the advantage of keeping both players busy. And, this isn't a "quick score" game, which means it is more like the real thing. However, when you do score, you get a song played (On, Wisconsin and the Notre Dame Fight Song). If you dislike thunder being shook down from the skies, you can change the songs.

Finally, the game can be played with a timer or be self-timed. Since there is no on-screen timer, its usually best to time it yourself. Otherwise, each half is about 18 minutes long, with no time-outs.

We enjoyed playing this one and think you will, too. And, in early summer it really whetted our taste for the upcoming season. Roll Tide!

Look for the...

RAINBOW CERTIFICATION SEAL

Software Review...

SISI IS FUN FOR KIDS, PARTIES

SISI, the fortune-telling program, is a simple little game that will keep the kids amused and provide some fun at almost any party.

This program (Harmonycs, P.O. Box 1573, Salt Lake City, UT, 84110-1573, $9.95) is pretty straightforward in that it doesn't do many fancy things, but it *does* work just fine and will keep everyone talking about your 80C.

It is based on that old fortune-telling game that most of us have seen -- where you ask the "magic ball" a question, turn it over, and get an answer. This program, however, has many more responses and provides a short test and art show to assist the fortune-telling process. And, the responses are more like those you get in Chinese fortune cookies.

Because the "art show" is in high-res graphics, you need a 16K extended 80C to run *SISI*.

TRS-80® COLOR COMPUTER SPECIALISTS

RAINBOW CERTIFICATION SEAL



COLORFORTH

FORTH is a high level computer language like BASIC or PASCAL. **COLORFORTH**, a version of figFORTH, is available NOW for the TRS-80C computer. **COLORFORTH** execution time is as much as 10 times faster than BASIC. **COLORFORTH** requires a minimum of 16K ram, but does not require either Extended Basic or disk system. When you purchase **COLORFORTH**, you receive both cassette and disk versions, the standard figEDITOR, and an extensive instruction manual.

ALL FOR ONLY..... $49.95

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COLOR COMPUTER DISK SYSTEM

We offer a complete disk drive interface system for the color computer, featuring the Tall Grass Technologies Double Density, buffered disk controller card. The disk interface board plugs into the color computer expansion socket and provides for doubling the storage capacity of single density type disk drives by using GCR encoding / decoding techniques. Power may be taken internally from the system or from an external power supply (not normally required even with piggyback 4116's installed)..This controller will support up to 4 single/double density, single/double sided 5 & 1/4 inch disk drives. These include Shugart 400 series, Siemens 82, TEAC 50 series, Pertec FD200, MPI B51/52/91/92, Tandon and others. The controller uses standard 10 sector diskettes and does not read or write the soft-sectored IBM style formats used by TRS-80 or FLEX systems. Two reasons for not using a soft sectored system are cost and reliability.

The Tallgrass double density format offers more margin for worn diskettes, dirt etc. and less expensive single density disk drives & diskettes. All you need to add to have a complete disk system is a disk drive / cable.

DISK OPERATING SYSTEM (DOS)

The Disk Operating System for the Tallgrass Technologies Disk controller (CCMD+9) is a full featured "BASIC" compatible operating system. It is fully integrated with the ROM basic system already in the color computer and automatically is initialized upon system power on much the same as the R.S. disk system does. But there is a big difference between that disk system and CCMD+9. First of all we support any mix of 35, 40 or 80 track single or double sided disk drives, which allows a minimum of 4 times the storage capacity of the "other" disk system. We also make far better use of the disk storage space by using sector allocation for each file instead of the granual method of 8 sector blocks which can waste anywhere from 1 to 7 sectors for each file on the disk. For example, on their DOS, if 5 files each required only 2 sectors there would be 40 disk sectors allocated, a waste of 30 disk sectors or almost 4 "granuals". This is not the case in our disk system, only the required number of sectors would be used.

Many other disk systems using a sector allocation system have a problem with file fragmentation and excessive seek time after a disk is used over and over adding and deleting files until it becomes so bad that the disk must be re-formatted to correct the problem. With CCMD+9 this is not the case, as files are deleted the disk space is automatically repacked to help keep files from being fragmented and decrease access time.

The DOS is contained in a ROM on the disk controller the same as the R.S. disk system so you don't have to "bootstrap" the DOS off of a disk and it doesn't get clobbered easily by a runaway program as most ram based systems do. The DOS does "NOT" require Extended Basic and will run on a 4, 16 or 32K system without any modifications. CCMD+9 uses approximately 1K of ram for the disk system which is taken from the top of memory, this allows all previously purchased tape software to function with the disk system, this is not so with the R.S. disk system.

CCMD+9 supports both Basic and Machine language programs. It is easily accessible to the beginner or advanced machine language programmer with easy to use and well documented entry points to perform disk as well as screen/printer/keyboard input & output. It includes 10 disk file functions to open, close, read/write random or sequential files, read specific sector of file, flush sector buffer to file, close & rewind file (re-open) and process disk system errors. The screen/printer/keyboard I/O functions include: input character, output character, output text string, output carriage return, output 2/4 hex characters, output space character and read/write single disk sector.

The "BASIC" interface system allows Basic and Basic programs to communicate with the disk system much the same as the R.S. disk system does with a few added features. It includes both Direct and Indirect basic commands, Direct commands can be executed any time and Indirect commands are contained with "Basic" programs. The Direct commands include: LOAD or SAVE (binary/ASCII basic program disk file), CHAIN (load & execute basic program) and CDOS "disk command", The "CDOS command allows you to execute a specific disk command from the free standing disk system, these include: LOAD/SAVE machine language or memory file, REMOVE one or more disk files, CHANGE disk file name, CHECK disk file for errors, ANALYZE disk directory, STRACK set tracks & sides for disk drive, SCMP set compare on/off, RUN load & execute machine language disk program. GOTO execute machine language program at specified address, and NEW initialize disk. If the "CDOS" command is executed without any command following control is passed to CCMD+9 where any of the previously mentioned commands can be executed directly thus providing total control of the entire system. The command system is easy to learn and remember with a minimum of effort on the users part. The BASIC interface system was designed to be compatible with the existing I/O commands used with tape files for easy conversion and upgrading to disk. When using Basic disk files up to 9 files can be active at once with all disk file memory allocation being done automatically at run time, you don't have to reserve file space as with the R.S. disk system. The Indirect basic commands include: Open, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic), these all function in the same manner as basic tape file I/O.

CCMD+9 has one other unique feature not found in most disk systems. Eash disk initialized by the system is assigned a disk label which can be used instead of a disk drive number, the system will automatically locate which drive the diskette is on and use it accordingly. This can be very usefull in basic programs which use files on multiple disks, you don't have to worry which disk belongs in which drive.

Part of the power and flexibility of CCMD+9 lies in the Disk Utility System which allows the system commands to be greatly expanded by adding utility or transient disk commands. These commands are automatically handled by the system so as not to overwrite Basic programs in memory and can even be called by a Basic program in some cases. For example you can perform a disk copy or backup while still preserving a basic program currently in memory, no other system that we know of has this ability. We currently have a list of utilities available and will be adding to it constantly to improve the system.

SOFTWARE SUPPORT

This disk system is the most recent one to enter the color computer disk market and is currently the only one with any disk software to support it. There should be no problem in the future with a lack of software for this system because, it is extremely easy to interface software to. We currently have available for the disk system: a Disk Assembler which allows files larger than memory to be assembled, a Disk Text Editor which makes writing Basic and Assembler programs easy and also will edit files larger than memory, a Disk Text Editor/Processor (WORD PROCESSOR) "TEXTPRO1 which is easy to learn and extremely powerful for its price range, TEXTPRO II is an advanced version with expanded features: programmable tabs, 3 line processable headers, decimal/center/right justify/ horizontal tabs, keyboard input processing and more. A Disk Disassembler/Source generator, a Disk system monitor which includes all of the "TRSMON" monitor commands & has access to all of CCMD+9 disk commands & automatically locates itself at the top of memory to stay out of the way, and a full compliment of disk utilities. The utility disk includes: full disk backup, build disk text file from keyboard, 24 hour screen clock, single or multiple disk file copy, text file executive processor, ASCII/HEX file dump/list/map utility, ASCII file lister/printer, and a disk relabel utility. All at prices far below what other disk system software sells for.

TG-99 Disk Controller w/CCMD+9 DOS ROM	**$159.95**
CCASM9 Disk Assembler	**$ 34.95**
CCEDT9 Disk Text Editor	**$ 24.95**
CCDISS Disk Disassembler Source Generator	**$ 29.95**
CCTPR1 Disk Text Editor/Word Processor TEXTPRO 1	**$ 39.95**
CCTPR2 Disk Text Editor/Word Processor TEXTPRO 2	**$ 59.95**
CCUTLY Disk Utilities	**$ 19.95**
DOSMON Disk system monitor/utility program	**$ 29.95**
CGAME1 HI-RES Graphic games Space Invaders, Meterioids, Space War	**$ 49.95**
CGAME2 Mixed games Battle Fleet, Space Traders, Adventure	**$ 39.95**

SPECIAL LIMITED OFFER

We have a complete disk system package,available that includes: a 40 track single sided disk drive with power supply, case, 2 drive cable, TG-99 controller w/CCMD+9 and a disk containing CCUTLY disk utilities and CCEDT9 disk editor all assembled and tested for $499.00
Additional 40 track drive with power supply & case tested. $300.00

For double sided drives add $100.00 per drive. Add $5.00 per drive for shipping, NO COD's on disk drives or disk system special. Shipping for disk controller add $2.50, for Disk software only add $1.00. Visa & M/C add 3% (this is what the bank charges us).

Manufactured under license from Tall Grass Technologies.

CO RESIDENT EDITOR/ASSEMBLER

Co-resident Editor/Assembler that will allow the user to create, edit and assemble machine language programs for the color computer. The editor portion of the program is similar to the text editor in TEXTPRO. The assembler will output machine object code to either cassette tape in a 'CLOADM' readable format or directly to memory for direct execution. The assembly listing can optionally be output to the printer connected to the RS-232/Printer port on the color computer. All errors are displayed with a full text message for easy identification. The assembler supports the full compliment of the M6809 instruction set and also will cross assemble 6800 source code to produce M6809 compatible object code.

CO-RES9 **$39.95**

SYSTEM MONITOR

TRSMON is a 2K system monitor program that will allow you to explore the workings of the color computer. It features 9 debuging commands, tape load and save compatible with Basic "CLOADM", up/down load via RS232 port, terminal package that allows the color computer to be used as a terminal at baud rates up to 9600 baud and a printer driver to direct display output to the printer for memory dumps, disassemblies etc. The program is position independent so it can be moved anywhere within the system memory. A very powerful tool at a very reasonable price. Commands Include:

Memory examine & change, Goto defined address, Load Tape program (w/offset), Load Motorola S1-S9 file (RS232), Save Tape program, Send memory file S1-S9 (RS232), Set and/or display breakpoints, Remove one or all breakpoints, Define printer/terminal baud rate, Set and/or display registers, Dump memory in Hex & Ascii format, Disassemble memory file, Terminal mode & optional buffer, Fill memory, Move block of memory, Find memory byte sequence, Exit monitor to Basic, Exit monitor to Rom Pack ($C000), Re-initialize monitor, Direct output to printer.

TRSMON ON TAPE **$19.95**
TRSMON on 2716 Eprom **$34.95**

8K COLOR RAM/EPROM CARTRIDGE HOLDS 4-2716 EPROM or RAM	**$24.95**
2K RAM CHIPS $19.95	**2716 EPROMS $14.00**
5¼" DISKETTES, SOFT OR HARD SECTOR, BOX OF 10	**$30.00**
MOTOROLA 6809 PROGRAMMERS MANUAL	**$11.95**
+ $2.50 SHIPPING 1ST CLASS	

TEXTPRO
TEXT EDITOR/PROCESSOR

TEXTPRO is a complete text editor & text processing program for the Color Computer. The program includes our powerful full function text editor plus the added features of a text processor. The entire program utilizes only 6K of memory space including the tape, screen and keyboard buffers. It is extremely fast in editing and processing text files and is compatible with Basic ASCII formatted tape files.

The Editor itself includes 24 commands including string search & replace; line and automatic line edit modes which allow you to insert, delete, change or add characters. Automatic line editing allows you to skip forward and backward for checking and editing, all screen editing immediately updates the screen so you know exactly what you are doing at all times. The Editor also has commands to move or copy single lines or blocks of text from one place to another. Some of the other commands include Tape load, save and append; Automatic line numbers, delete line, set input line length and printer output.

The Text Processor includes 29 commands for formating the output, some of them include: page length, left margin, top & bottom margin, line length, justify & fill modes, page heading, center line, double width print, margin control, single, multiple & special indent modes, test lines left on page, display & input from keyboard and even special control codes can be sent to the printer for different print densities etc. It even has a repeat command with a next command to redo all of or a portion of the file as many times as needed. TEXTPRO will turn your color computer into a full fledged text processing machine at a price you won't believe. Available on 'CLOADM' compatible cassette.

SPECIAL INTRODUCTORY PRICE $29.95
RS. DISK VERSION $49.99

DATAPACK
DATA COMMUNICATIONS PACKAGE

DATAPACK is a Terminal package program for the COLOR COMPUTER, allowing you to use the color computer as a buffered computer terminal through a modem to a time sharing network or as a direct connect terminal to another computer system at rates up to 9600 baud. This program is more than a standard "Videotext" type program in that it will allow you to save data stored in the buffer either to cassette tape, or output a hard copy to a printer. The data buffer is automatically set to the maximum size of your system memory when entered to allow maximum space for saving data. The program includes features to send control codes and to enable or disable keyboard echo. When the terminal mode is exited the contents of the buffer may be viewed on the screen or saved to tape for later loading. Also the RS-232 port can be used to plug your printer back in for sending the screen buffer to the printer. An additional feature is the ASCII format that is used on tape is compatible with the CER-COMP Text Editor program and BASIC, enabling you to edit or delete unwanted information.

PRICE: $24.95 ON CASSETTE
RS. DISK VERSION $49.95

5566 Ricochet Avenue
Las Vegas, Nevada 89110

CER-COMP
(702) 452-0632

All Orders Shipped From Stock
Add $1.00 Postage – MC/Visa Add 3%

Game...

ICE LANDER CAN BE A SLICK RUN

Ted Shorter writes us from Cuyahoga Falls, Ohio, to say that he is 13 years old "and a computer freak."

We're not certain what the definition of a "computer freak" is, but if it means a promising young programmer, then Ted fills the bill.

16K ECB



He explains this game, the listing of which follows, this way:

"I'd been using SET and PSET to move dots around the screen when I decided to try my hand with GET and PUT to move objects instead. It would look better to have actual space ships moving around than dots.

"After a long period of trial and error I got an idea for a lunar lander type of game.

"It took me an afternoon to write the basic loop, but it took me about a week to get everything down just right.

"So here it is. I was surprised at how long it was. I couldn't believe I did all that!

"Here is a description of the lines in the program:

```
   1    -    4 Credits
   10        Dimension arrays
   30   -   60 Menu
   70   -  400 Main loop
  410   -  810 Various subroutines
10000   -  High score subroutine
```

Note: This game uses a POKE 65495,0 to speed up the game. If your computer can't handle it, then delete lines 460, 630 and 710 and edit line 200 to read GOSUB470.

This game also features a high score subroutine that requires joysticks so you can put your name in. Just for interest, my high score is 1610.

```
1 'ICE LANDER
2 'BY TED SHORTER 1981
3 '2578 SYLVAN RD.
4 'CUYAHOGA FALLS,OHIO,44221
10 DIM L(2),B(2),K(18):G=.1:HN$=
"NOBODY":HS=10
20 CLS:YM=0
30 PRINT"1 START GAME":PRINT"2 G
ET INSTRUCTIONS":PRINT"3 CHANGE
GRAVITY LEVEL"
40 PRINT@265,"WHICH ONE?"
50 FOR Z=1 TO 2000:Y$=INKEY$:IF
Y$="1" THEN 70ELSE IF Y$="2" THE
N 770 ELSE IF Y$="3" THEN 410
60 NEXT:PRINT"WELL?":GOTO 50
70 CLS:POKE 65494,0:INPUT"OXYGEN
 LEVEL";O
80 IF O>200 THEN PRINT"YOU'LL BE
 SORRY!!":O=51
90 OO=O
100 PMODE 4,1
110 PCLS
120 DRAW"BM128,96D4U2R4D2U4L4"
125 PAINT(129,97),5,5
130 FOR Z=1 TO 25:X=RND(18):X=X+
100
140 Y=RND(18):PSET (X,Y,5):NEXT
150 GET(100,0)-(118,18),K,G
160 GET (128,96)-(132,100),L,G
170 GET (0,0)-(4,4),B,G
180 PCLS
190 SCREEN 1,1
200 GOSUB 460
210 X=9:Y=9:XM=3
220 Y$=INKEY$
230 PUT(X-2,Y-2)-(X+2,Y+2),B,PSE
T
240 IF Y$="^" THEN YM=YM-1
250 IF Y$=CHR$(10) THEN YM=YM+1
260 IF Y$=CHR$(9) THEN XM=XM+1
270 IF Y$=CHR$(8) THEN XM=XM-1
280 X=X+XM:Y=Y+YM
290 YM=YM+G
300 IF Y<9 THEN Y=9
310 IF X<9 THEN X=9
320 IF Y>189 THEN Y=189
330 IF X>244 THEN X=244
340 O=O-1:IF O=50 THEN PLAY"L32C
CC" ELSE IF O<0 THEN 680
350 IF PPOINT(X,Y+3)=5 AND PPOIN
T (X+4,Y+3)=5 AND XM=0 AND YM<2
THEN 580
360 IF PPOINT(X+4,Y+3)=5 AND PPO
INT(X,Y+3)<>5 THEN PUT(X-6,Y-5)-
(X+12,Y+13),K,PSET:GOTO 680
370 IF PPOINT(X,Y+3)=5 AND PPOIN
T(X+4,Y+3)<>5 THEN PUT(X-12,Y-5)
-(X+5,Y+13),K,PSET:GOTO 680
380 IF PPOINT(X,Y)=5 OR PPOINT (
X+4,Y)=5 THEN 680
390 PUT(X-2,Y-2)-(X+2,Y+2),L,PSE
T
400 GOTO 220
410 CLS:PRINT"        CHOOSE:"
420 PRINT"1 NO GRAVITY(EASY)":PR
INT"2 LITTLE GRAVITY(FAIRLY EASY
)":PRINT"3 EARTH GRAVITY(HARD)":
PRINT"4 JUPITER GRAVITY(VERY HAR
D)"
430 PRINT"           WHICH?"
440 G$=INKEY$:IF G$="1" THEN G=0
 ELSE IF G$="2" THEN G=.1 ELSE I
F G$="3" THEN G=.5 ELSE IF G$="4
" THEN G=.7
```

(Continued on next page)

ICE(From Page 25)

```
450 IF G$="" THEN 440 ELSE 20
460 POKE 65495,0
470 LINE-(0,100),PSET:PCLS
480 FOR X=10 TO 120 STEP 10
490 Y=RND(160):Y=Y+20
500 LINE-(X,Y),PSET
510 NEXT
520 LINE-(X+5,Y),PSET
530 FOR X=130 TO 250 STEP 10
540 Y=RND(160):Y=Y+20
550 LINE-(X,Y),PSET
560 NEXT:Y=RND(160):Y=Y+20:LINE-
(255,Y),PSET:PAINT(10,180),5,5
570 RETURN
580 PUT(X-2,Y-2)-(X+2,Y+2),L,PSE
T
590 POKE 65494,0
600 FOR Z=1 TO 4
610 PLAY"L16CGO4CO3"
620 NEXT
630 POKE 65495,0
635 S$=STR$(FIX(Y+4)*10+0*VAL(G$
)-00)
640 CLS:PRINT"YOUR SCORE="+S$
645 S=VAL(S$)
650 PRINT"AMOUNT OF OXYGEN LEFT=
";O
660 FOR Z=1 TO 460*16:NEXT
665 GOSUB 10000
670 GOTO 20
680 PUT(X-9,Y-9)-(X+9,Y+9),K,PSE
T
690 POKE 65494,0
700 PLAY"L4FFL8FL4FG+L8GL4GL8FL4
FL8EL2F"
710 POKE 65495,0
715 GOSUB 10290
720 GOTO 20
730 CLS:PRINT"          ICE LANDER
"
740 PRINT:PRINT"EVERY TIME YOU H
IT AN ARROW,YOU GO FASTER IN THA
T DIRECTION.....BUT GRAVITY PLAY
S A PART,TOO.":PRINT:PRINT"OXYGE
N STARTS AT WHAT YOU SET,  UNLES
S YOU ENTER MORE THAN 200. THEN
IT LEAKS AND YOU ONLY HAVE 50."
750 PRINT"HIT [ENTER]."
760 IF INKEY$=CHR$(13) THEN GOTO
 20 ELSE 760
770 CLS:PRINT"          ICE LANDER
"
780 PRINT" YOU MUST PILOT A SHIP
 OVER THE FROZEN PLANET GARBONZO
."
```


Own a TRS-80 Color Computer? Wish you had Lower Case?

For $75.00 and five minutes of your time you can have full upper and true lowercase (not just reverse video) with the LCA-47 lowercase adapter from Micro Technical Products.

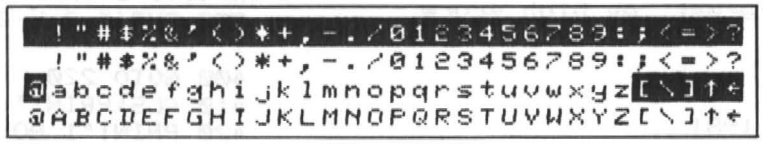
What is it? The LCA-47 is a small PC board (1.9 × 3.6 in.) that plugs into your computer's main PC board: leaves the expansion connector free. It doesn't take up any system memory: uses a fast Bipolar Character Generator for guaranteed operation.

Installation is quick and simple: no cutting or soldering required.

Fully assembled, tested, and guaranteed for 1 full year.

Two switches provided on board: one to enable or disable the lowercase. The other to invert the entire screen (light characters on a dark background).

What does it provide? The 128 characters below: improved upper case and very readable lowercase with descending tails, all available to both Basic and machine language programs.



RAINBOW CERTIFICATION SEAL

Custom character sets are available as an option, call for a quote.

Compatibility: The LCA-47 is fully compatible with all TRS-80C software that we know of, including Color Scripsit. It has no effect on any semi-graphics or full-graphics modes. Also works great with Micro-Chroma-68 Kits and others using the 6847 VDG chip! The LCA-47 will not fit under the RF shield if Computerware's "16-plus" memory board is installed.

How to order: Send $75.00 plus $5.00 shipping in the U.S., $10.00 elsewhere, to:

Micro Technical Products, Inc.

814 W. Keating Ave., Dept. A
Mesa, AZ 85202

Arizona residents add $3.75 sales tax.

Phone: 602-839-8902
MC and VISA welcome.

```
781 PRINT"WEIRD SHAPES OF DEADLY
 ICE FORM."
782 PRINT"USE THE ARROW KEYS FOR
 CONTROL."
783 PRINT"WHEN YOU ARE ASKED FOR
 AMOUNT OFOXYGEN, REMEMBER THAT
175 IS A  NORMAL AMOUNT."
784 PRINT"A WARNING BUZZER TELLS
 YOU WHEN YOUR OXYGEN IS LOW."
790 PRINT"YOU MUST LAND ON A FLA
T SURFACE."
800 PRINT"HIT [ENTER]"
810 IF INKEY$=CHR$(13) THEN GOTO
 730 ELSE 810
10000 IF S<HS THEN 10290 ELSE CL
S:PRINT"GREAT SCORE!!!!!"
10010 PRINT"YOUR SCORE BEAT THE
FORMER HIGH SCORE.YOU SHOULD BE
PROUD OF       YOURSELF!!!!!!!"
10020 PRINT:PRINT"ENTER YOUR NAM
E IN.MOVE THE     JOYSTICK BACK&
FORTH TILL YOU GETTHE RIGHT LETT
ER.THEN PRESS THE BUTTON WHEN TH
E LETTER IS RIGHT.";
10025 HS=S:N$=""
10030 PRINT:PRINT
10040 PRINT" ";:RESTORE:FOR PL=1
 TO 26
10050 READ LP$:PRINTLP$;
10060 NEXT
10070 DATA A,B,C,D,E,F,G,H,I,J,K
,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z
10080 PRINT" O"
10090 PRINT@384+28,"V"
10100 PRINT@416+28,"E"
10110 PRINT@448+28,"R"
10120 PRINT@321,"";
10130 X=JOYSTK(0)
10140 W=X/2.25
10150 W=INT(W)
10160 IF W=27 THEN W=28
10170 IF W=0THEN W=1
10180 PRINT@320+W,"V";
10190 FOR Z=1 TO 10:NEXT:PRINT@3
20+W," ";
10200 P=PEEK(65280)
10210 IF P=254 OR P=126 THEN L=W
 ELSE 10130
10220 IF L=28 THEN 10290
10230 RESTORE:FOR LL=1 TO L
10240 READ L$:NEXT
10250 N$=N$+L$:HN$=N$
10260 IF LEN(N$)=4 THEN 10290
10270 PRINT@416+11,N$;
10280 GOTO 10130
10290 CLS:PRINT"TOP SCORE IS"HS"
BY "HN$
10300 FOR Z=1 TO 460*12:NEXT
10310 RETURN
```

Software Review...

DISK DOCTOR A GOOD PRESCRIPTION

Twas the night before mailing *the RAINBOW* and all through the place

Arose a wailing because on the mail list disk of addresses there was not a trace...

We apologize for the bad poetry (we hope none of you will review *it*), but it does serve to point out that even the best handling and the most vital of information can crash on a disk. And when it does (and when your two backups do, too), my friends, there's trouble in River City.

We were able to go through the mailing records on hard copy by hand when that happened back in December. It did take about 15 hours, and there were not nearly as many subscribers then. And, while a disk is a wonderful thing, when it goes wrong it goes wrong. Just points up the fact that even the 80C isn't immune to Murphy's Law.

What we needed, desperately, was the *DISK DOCTOR*.

Too late to have helped us through that particular travail of toil, but not too late if it ever happens again comes a marvelous utility program from Superior Graphic Software (406 Little Mountain Road, Waynesville, NC, 28786, $49.95) that will salvage your crashed disks quickly and easily. It will even restore files that you might have KILLED by mistake.

DISK DOCTOR simply allows you to examine a disk track by track, sector by sector, and salvage the files there. No matter if the directory track is destroyed. No concern if the file allocation table is garbage. No worry whether you are dealing with BASIC programs, machine language programs or data files. This one will save them all to a new disk and, of course, write a new directory and file allocation table in the process.

There are no instructions with *DISK DOCTOR*. Normally, this would bring about automatic disapproval from this reviewer. But it does not because this program comes, instead, with a crashed disk and a step-by-step guide on how to salvage it. Once you've gone through the process, you don't need instructions. Its a good learning tool.

We are very enthuastic about *DISK DOCTOR*. It lets you zip

(Continued on next page)

DOCTOR (From Page 27)

from sector to sector, track to track, backwards and forwards quickly and easily. It displays what is on a specific disk track, and it also gives you a large graphic blank space if there is nothing there. When you salvage tracks, they write on the screen in graphics, so you know how much space you are filling up. Then, quick as a wink, you simply transfer the salvaged material to a new disk.

Finally, as a bonus, one of the programs on the crashed disk Superior supplies is a nice utility -- a machine language program packer which removes all the extra spaces in a BASIC program. All you have to do is salvage it off the crashed disk and it is yours.

DISK DOCTOR requires 32K and, of course, at least one disk drive. And if you have one, you ought to have *DISK DOCTOR.*

RAINBOW SEAL TO HELP CONSUMERS

The RAINBOW is pleased to announce implementation of the *RAINBOW SEAL OF CERTIFICATION.*

The Seal is a service of *the RAINBOW* and is available to any vendor who is selling items for use with the TRS-80 Color Computer. *The RAINBOW* makes no charge whatsoever for use of the Seal by vendors.

Use of the Seal, however (shown on the right) is allowed only under very specific guidelines. In order to secure use of the Seal for a product, a vendor must have a copy of a product on file with *the RAINBOW.*

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CERTIFICATION
SEAL

Our guidelines are very specific. In terms of programs, a vendor is not allowed to display the *RAINBOW* Seal for any version of a program which is not on file and commercially available. In other words, in order for a Seal to be available for both a cassette and disk version of a program, both the cassette and disk versions much be on file with *the RAINBOW.*

Vendors are allowed to display the Seal in their advertising when notified by *the RAINBOW.* Any instances of a Seal being improperly displayed will receive prominent display in this magazine.

The RAINBOW Seal program has been devised by us in an effort to protect you, the consumer. We hope you will look for the Seal in any advertisments you see and act accordingly. Vendors awarded the Seal are not limited to using it with the advertisments in *the RAINBOW.*

We also believe the Seal will

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protect the overwhelming number of honest vendors who produce the quality products you expect to receive when you send them money. We hope you will use the Seal as a guide when making a purchase.

Awarding of the Seal carries no warranty of any kind from *the RAINBOW*. It simply means we have received a product and that the product does, indeed, exist. The Seal is not an attempt to evaluate a product. We hope you will continue to look to our reviews to do that.

We hope you will find the Seal useful and helpful.

Finally, we ask you to note that implementation of the Seal will take some time. Because of that, please do not draw any conclusions from lack of a Seal on any advertising in this issue of *the RAINBOW* (or any other publication in the next several weeks or months). Deadlines of all publications are such that it sometimes takes a little time to change advertising copy.

BACK ISSUE AVAILABILITY

Back copies of *ALL* issues of *the RAINBOW* are again available.

All back issues sell for the single issue cover price -- which is $2 for copies of numbers 1-8 and $2.50 for copies of numbers greater than 8. In addition, there is a $3.50 *per order* charge for postage and handling. This charge applies whether you order one back issue or all of them.

Most back issues are available on white paper in a reprint form. All back issues now available would be $23.50, plus $3.50 postage and handling -- a total of $27. VISA and MasterCard accepted. Kentucky residents add 5% sales tax.

Due to heavy demand, we suggest you order the back issues you want now.

SUBMITTING MATERIAL TO RAINBOW

Contributions to the RAINBOW are welcome from everyone. We like to run a variety of programs which would be useful/fun/helpful to other 80C owners.

Program submissions should be on tape or disc. We're sorry, but we do not have the time to key in programs. All programs should be supported by some editorial commentary, explaining the program and how it works. We're more interested in how it works than how you developed it. Programs should be learning experiences.

If you wish, editorial material can be written with any of the word processors currently available for the 80C, or for Scripsit 2.0 running TRSDOS 2.0a for the Model II. Typed (or printed out) copy double spaced is fine, however. Please do not imbed control codes for any particular printer.

We do pay for substantative submissions, based on a number of criteria. Those wishing renumeration should so state when making submissions.

Please do not submit programs or articles currently submitted to another publication.

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*Reviewed in the RAINBOW

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MAKING SPECTACULATOR STRUT ITS STUFF

By Dick White

Who hasn't at least thought about writing a checkbook balancing program or thought of buying one early on in their computer experience?

There are certainly 20,000 or more checkbook programs in existance than there need to be and I may be guessing low. Of course, I have made my contribution to the debris and I don't feel at all bad about making another, since it is a good example to use to show how *SPECTACULATOR* operates.

To fully use it you need to understand how it works. The book that comes with the program does a good job of describing the basic command structure and giving some examples.

But, once you add complexities, problems can crop up. In many cases there seem to be solutions, but ingenuity and a non-conventional way of looking at things may be required.

SPECTACULATOR is not all that VisaCalc is, but it still is quite a powerful program. For example, it took me a good 40 to 50 hours to write and debug my checkbook program in BASIC. It took me an hour to program SPECTACULATOR to do the same job.

In addition, SPECTACULATOR will print out the results while my program won't. At the outset, here are some things to keep in mind:

1. SPECTACULATOR calculates all column functions before it does any row Functions.
2. It calculates columns from left to right and rows from top down.
3. In any cell, a row function has priority over a column function.
4. When using commands involving individual rows and columns, there must be an entry in each row or column cited (the entry can be a 0) for the calculation to be made.
5. When using SUM, there must be a number in the start row or column for the calculation to be made. There do not need to be entries in rows or columns between the start and the total.
6. Column functions apply to all rows in that column except those where row functions are assigned. Row functions apply to all columns in that row.

One way to get a good handle on these rules is to work through a simple demonstration. Before calculating, our spreadsheet look like this:

	1	2	3	4
1				C2+C3
2		2		
3		3	0	
4		4	0	
5	SUMR2			
6	R5			
7		5	0	
8		6	0	
9		7	0	
10	SUNR6			
11	R12			
12	R10			

The functions involved have been entered as text in Row 1 and Column 1. Note that there is no "0" in Cell 2,3. After calculating, the sheet looks like this:

	1	2	3	4
1				C2+C3
2		2		
3		3	0	3.00
4		4	0	4.00
5	SUMR2	9.00		
6	R5	9.00		
7		5	0	5.00
8		6	0	6.00
9		7	0	7.00
10	SUNR6	27.00		
11	R12			
12	R10	27.00		

Column 2 has been totalled in Row 5 but Columns 3 and 4 have not due to the absence of an entry in start Cell 2,3. The missing entry prevents calculation of the column function across Row 2.

Everything works in Column 2 except moving the Row 12 total to Row 11. Since the program moves down the column, there was no value in Row 12 when the Row 11 calculation occured.

It is difficult to demonstrate the priority of row functions in a cell over column functions. If we had a Column 5 with a column function C2, Column 5 would look just like Column 2. This is not because everything in Column 2 was copied into Column 5. Only the entries would have been copied with the totals being supplied by the row functions. A second calculation will produce this sheet:

(Continued on next page)

SPECTACULATOR (From Page 31)

	1	2	3	4
1				C2+C3
2		2		
3		3	0	3.00
4		4	0	4.00
5	SUMR2	9.00		
6	R5	9.00		
7		5	0	5.00
8		6	0	6.00
9		7	0	7.00
10	SUNR6	27.00		
11	R12	27.00		
12	R10	27.00		

Cell 11,2 has been filled in with the value that was in Cell 12, 2 before the calculation. To prove this to yourself, simply change one of the entered values in Column 2. Cell 11,2 will be 27.00, but Cell 12,2 will be something else. Finally, put a "0" in Cell 2,3 and calculate. Rows 3 and four fill out except for Row 11.

	1	2	3	4
1				C2+C3
2		2	0	2.00
3		3	0	3.00
4		4	0	4.00
5	SUMR2	9.00	0.00	9.00
6	R5	9.00	0.00	9.00
7		5	0	5.00
8		6	0	6.00
9		7	0	7.00
10	SUNR6	27.00	0.00	27.00
11	R12	27.00		
12	R10	27.00	0.00	27.00

Now let's set up the checkbook "program" in SPECTACULATOR. Figures 1 and 2 are printouts from SPECTACULATOR of a ficticious run. I used Row 1 and Column 1 to show the column and row numbers. Column functions are shown in Row 2 and the row function in the date column. Set the following colulmn widths:

1,7 2,5 3,4 4,7 5,7
6,12, 7,16 8,16

Columns 9 and 10 are esssentially a scratch pad and will set their own width as required. Set the following column and row functions:

Col 5-C10 Col 9-C5-C4
Col 10- SMTC9
Row 98- SUMR5

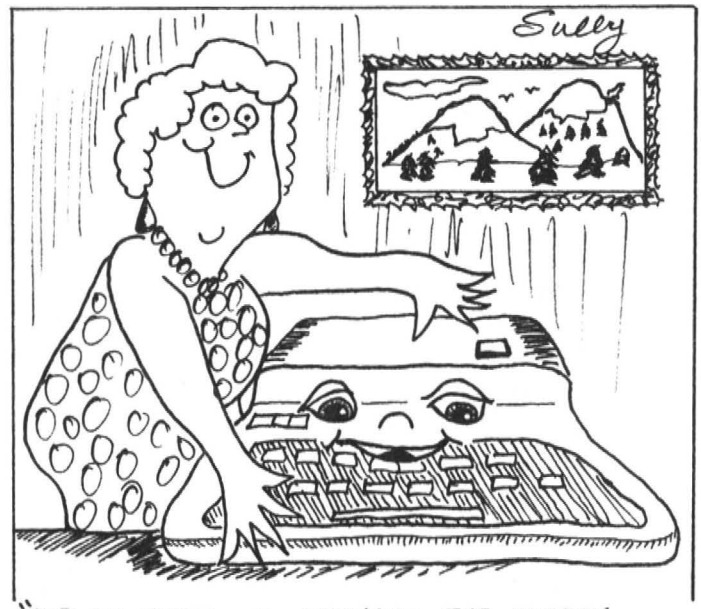
In Row 3, enter the text headings shown in Figure 1. Finally, enter a "0" in each row of Column 5 from Row 5 to Row 97. You should now save your program to tape so you can have a fresh spreadsheet in the future rather than having to clean up a used one.

To use your checkbook, enter dates and check numbers (or other transaction identification) in Columns 2 and 3 using the ET mode. Check values and other charges are entered (EN mode) as debits in Column 4. Deposits and other monies into the account are entered as credits in Column 5.

When you enter a credit, YOU MUST enter a "0" in the debit column. If we had filled out Column 4 with zeros, the program would have wasted time calculating down to Row 98 each time. This way the presentation is cleaner and faster. Just don't forget to fill Column 4 when you put deposits in Column 5. Payee and purpose go into Columns 7 and 8 at your option.

You will need to perform two calculations. On the first, SPECTACULATOR will fill in Columns 9 and 10. Since it works left to right, it will make no new entries under balance in Column 6. It does this on the second calculation.

It is quickest if you enter all your updates and then run the calculations. Save your working spreadsheet to tape (twice for safety) and run it back in when needed. When you get to the bottom, save it for reference and load the fresh sheet you made at first. Note that on a fresh sheet, the starting balance goes under Credits on Row 4 and "0" must be entered in Column 4 of that row.



"AND TO THINK, I THOUGHT THE NICEST TOUCH IN THE WORLD WAS MY FLOATING POINT 9-DIGIT ACCURACY. I THINK I'M IN LOVE!!"

1	2	3	4	5	6	7	8
2					C10		
3	DATE	TRNS	DEBIT	CREDIT	BALANCE	PAYEE	PURPOSE
4	BALANCE		0	665.14	665.14		
5	4/5	4117	18.70	0	646.44		
6		DEP	0	415.16	1061.60		
7	4/12	4118	15.89	0	1045.71		
8		4119	7.80	0	1037.91		
9		4120	752	0	285.91	INTERNAL REV SVC	INCOME TAX DUE
10		4121	61	0	224.91	DEPT OF TAXATION	STATE INC TAX
11		4122	12.99	0	211.92	CITY TAX DEPT	CITY INC TAX
12				0			
97				0			
98	SUMR5		868.38	415.16	4514.40		

Figure 1

9	10
C5-C4	SMTC9
665.14	665.14
-18.70	646.44
415.16	1061.60
-15.89	1045.71
-7.80	1037.91
-752.00	285.91
-61.00	224.91
-12.99	211.92
-453.22	4514.40

Figure 2



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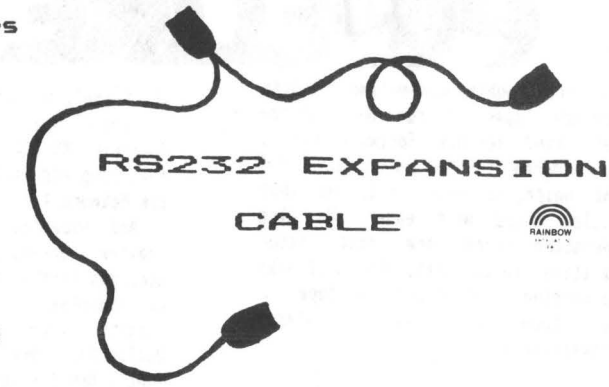
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PIPELINE

Having trouble converting machine language tapes to run on that new disk drive? Tom Mix Software has a new program in the works called *THE FIXER* which, we hear, will do that little chore with ease. We also understand there are some other utilities in the works that will make the backing up of disks to tape -- and tape to disks -- almost automatically.

One of the most widely-desired business type programs we hear about is something that will handle mailing lists. Computerware announces a new mail list program, as well as a new graphics arcade game called *STARSHIP CHAMELEON* and a checkbook manager program. All are said to be available now.

One of the things that is not available yet, but, we hear, is in the final stages, is a nothing-like-it arcade game from Mark Data Products (*BRESERK* and others). Look for a review shortly.

The inside dope from Ft. Worth is that the Radio Shack's editor/assembler should be available very shortly now. Not so for their new Investment Analysis package, which isn't due until September 1.

Radio Shack has announced a four-pin RS-232 cable that is five feet long and will connect the 80C to its Network III.

And speaking of Radio Shack, they've arranged to make American Airlines flight information available on Videotex in the Dallas area for flights into and out of the Dallas-Ft. Worth regional airport. That's DFW for you flying buffs.

Platinum Software says it has a new program which will allow full screen editing of BASIC programs, gives automatic line numbering and allows single key entries of more than 90 BASIC words. It comes with a plastic overlay. There will be a review.

There are two contests going in this month's edition of *the RAINBOW*. One is detailed in the FRP Column by Bill Nolen. There are details about the other in the editor's column, *PRINT #-2,*.

Except for the month of December, when things are really bad due to the Christmas mail rush, you should expect your copy of *the RAINBOW* absolutely no later than the 25th of any month. We're going to try to advance that a bit, but that's a safe cutoff point. If you have not received your current month's issue by the 25th, please write us a postcard. We'll rush a replacement issue to you.

Do you spell as poorly as we do? If so, there is an answer in the wings -- a spelling checker from Star-Kits. We hear that the program will be available in both tape and disk versions and will have a dictionary of some 20,000 words. That would be a big bonus in word processing software. Expect a review next month.

Quite a number of books are beginning to appear on the 80C. We've either seen announcements or news releases on several of them. They'll be reviewed as received.

In our review of the GSPR program available from Custom Software Engineering, we mentioned that the program worked well but that it did not have a driver routine which could be used with the 1.0 ROM. Now, Custom has a second version of this program which includes an eight-bit driver so that 1.0 ROM users can use this program without having to load a separate driver.

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FRP Aids...

NOW A WHOLE BAG OF DICE

By Bill Nolen
RAINBOW Columnist

Well, here it is, April already. Yes, I know you're reading this in June, but I'm writing it in April. For those of you who don't live in Arizona, don't worry, I'm not going to talk about the weather.

I am going to talk about how you can replace your $5 set of dice with a $600 computer, not counting the TV. The program below will replace your dice, and automatically compute just about any range of probabilities needed in an FRP game.

After you type in the program and run it, a border will be drawn around your screen, and a menu of 36 different choices will be presented to you. You just key in your choice -- no need to hit enter -- and the results will be displayed at the bottom of the screen.

All results are figured "correctly," so that the odds of any given number popping up are the same as if you had actually rolled the proper number of dice.

If you want to simulate the roll of two six-sided dice, giving a spread of 2-12, you have to total two RND(6) statements. Of course, you can get a spread of 2-12 in other ways, like RND(11)+1, but the key word above is "simulate." A computer is a very useful tool to do simulations, for business or hobby, and a lot can be learned from an accurate simulation, but the simulation must accurately mimic the actual, or it will just be misleading.

Now, let's take a close look at the program.

The lines from 210 to 560 are the subroutines that compute the random numbers. Lines 100 and 110 are the control routines which call the various subroutines, and the lines numbered lower than 100 set things up, print the menu, and call the subroutine in 6000, which draws the border. (I'll get back to that border in a moment.)

At line 5000, the program prints the title at the top of the screen, and the message "key your choice" at the bottom. When you hit a key, the computer calls it K$, checks it to be sure it has a value from 0-3, and then pokes it into screen memory at the right side of line 15, so you can see what you hit. The 80C then waits for another key to be hit, calls it KK$, and concentenates it with K$. That long word means "combine together," and it is done with the plus sign.

It looks like addition, but it's not. If 10 and 6 are numbers, and you add them with the plus sign, you get 16, but if 10 and 6 are strings, and you concantenate them, again using the plus sign, you get 106.

Try these two examples: First, type PRINT 10+6 <ENTER>. Then try PRINT "10" + "6" <ENTER>. Anything in quotes is a string, and what you get depends on whether you start with strings or numbers.

Anyway, once the computer has the numbers keyed in, it returns to the control routine, and then branches to one of the lines numbered 210 to 560, where it calculates the value of R (results). Then it goes to 5200, where the result is printed on the screen (across the bottom), while a prompt ("hit any key") is printed across the top. After you look at your results, just hit any key, like it says, and you will once again have the title and the instruction "key your choice" on the screen.

Now for more about that border. You may find line 6000 useful in other programs you write. I use it anytime I want a border drawn around the screen display.

Look at Line 10, and you will see the sequence of commands CLS:XX=230:GOSUB 6000. The CLS

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clears the screen, of course, and the XX= gives a value to this variable that will be used in the subroutine at 6000. The subroutine uses two FOR/NEXT loops to poke the value XX into all of the memory locations representing the edges of the text screen.

You can change the appearance of the border by giving XX a different value in line 10. Any value from 0 to 255 will work. Some will make colored borders, and some will make borders composed of letters or other characters. Try the values 35, 42, and 30. By the way, the numbers are the same ones you would use with the CHR$ statement.

On to the contest. You may have noticed that this column has no name. Well, if you have an idea for one, you can submit it, and if we pick your choice, you will win a gift certificate for $50 in merchandise from Prickly-Pear Software. If you come in second or below, you don't win anything. There's no room for second best.

All entrlies must be submitted either to *the Rainbow* (mark the envelope "FRP Name Contest"), or to Prickly-Pear Software at the address below. Write your idea on any old piece of paper, along with your name and address. The decision of the judges will be final, and the winner will be announced in this column in August, so hurry.

Remember, if you have complaints, write to me at my P.O. Box in Saudi Arabia, or send your letter to Lonnie Falk, at *the RAINBOW*, and clearly mark the outside "DO NOT FORWARD." If you have comments or suggestions (or questions), write me at:

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16K ECB

```
1 '****COPYRIGHT 1982****
2 'PRICKLY-PEAR SOFTWARE!
3 '*3518 S. RANDI PLACE*
4 '**TUCSON, ARIZONA**
5 '*******85730*******
10 X=RND(TIMER):CLS:XX=230:GOSUB
 6000:CC$=STRING$(30," ")
20 PRINT@66,"01. 1-2   13. 2-16
 25. 4-48";:PRINT@98,"02. 1-3
14. 2-20  26. 5-8";:PRINT@130,"0
3. 1-4   15. 3-9   27. 5-20";:PR
INT@162,"04. 1-6   16. 3-12  28.
 5-30";
30 PRINT@194,"05. 1-8   17. 3-18
  29. 5-40";:PRINT@226,"06. 1-10
  18. 3-24  30. 6-36";:PRINT@258
,"07. 1-12  19. 3-30  31. 6-48";
:PRINT@290,"08. 1-20  20. 4-14
32. 7-12";
40 PRINT@322,"09. 2-5   21. 4-16
  33. 7-42";:PRINT@354,"10. 2-7
  22. 4-24  34. 7-56";:PRINT@386
,"11. 2-8   23. 4-32  35. 8-64";
:PRINT@418,"12. 2-12  24. 4-40
36. %ILE";
100 GOSUB 5000:R=0:ON K GOSUB 21
0,220,230,240,250,260,270,280,29
0,300,310,320,330,340,350,360,37
0,380,390,400,410,420,430,440,45
0,460,470,480,490,500,510,520,53
0,540,550,560
110 GOSUB 5200:GOTO 100
210 R=RND(2):RETURN
220 R=RND(3):RETURN
230 R=RND(4):RETURN
240 R=RND(6):RETURN
250 R=RND(8):RETURN
260 R=RND(10):RETURN
270 R=RND(12):RETURN
280 R=RND(20):RETURN
290 R=RND(4)+1:RETURN
300 R=RND(6)+1:RETURN
310 R=RND(4)+RND(4):RETURN
320 R=RND(6)+RND(6):RETURN
330 R=RND(8)+RND(8):RETURN
340 R=RND(10)+RND(10):RETURN
350 R=RND(3)+RND(3)+RND(3):RETUR
N
360 R=RND(4)+RND(4)+RND(4):RETUR
N
370 R=RND(6)+RND(6)+RND(6):RETUR
N
380 R=RND(8)+RND(8)+RND(8):RETUR
N
390 R=RND(10)+RND(10)+RND(10):RE
TURN
400 R=RND(6)+RND(6)+2:RETURN
410 FOR X=1 TO 4:R=R+RND(4):NEXT
:RETURN
420 FOR X=1 TO 4:R=R+RND(6):NEXT
:RETURN
430 FOR X=1 TO 4:R=R+RND(8):NEXT
:RETURN
440 FOR X=1 TO 4:R=R+RND(10):NEX
T:RETURN
450 FOR X=1 TO 4:R=R+RND(12):NEX
T:RETURN
460 R=RND(4)+4:RETURN
470 FOR X=1 TO 5:R=R+RND(4):NEXT
:RETURN
480 FOR X=1 TO 5:R=R+RND(6):NEXT
:RETURN
490 FOR X=1 TO 5:R=R+RND(8):NEXT
:RETURN
500 FOR X=1 TO 6:R=R+RND(6):NEXT
:RETURN
510 FOR X=1 TO 6:R=R+RND(8):NEXT
:RETURN
520 R=RND(6)+6:RETURN
530 FOR X=1 TO 7:R=R+RND(6):NEXT
:RETURN
540 FOR X=1 TO 7:R=R+RND(8):NEXT
:RETURN
```

(Continued on next page)

FRP (From Page 39)

```
550 FOR X=1 TO 8:R=R+RND(8):NEXT
:RETURN
560 R=RND(100):RETURN
5000 PRINT@33,CC$;:PRINT@42,"THE
 DICE BAG";:PRINT@449,CC$;:PRINT
@457,"KEY YOUR CHOICE";:K$=INKEY
$
5010 K$=INKEY$:IF K$="" THEN 501
0 ELSE IF VAL(K$)>3 THEN 5010 EL
SE SOUND 150,1:POKE 1500,(VAL(K$
)+112)
5020 KK$=INKEY$:IF KK$="" THEN 5
020 ELSE SOUND 150,1:K$=K$+KK$:K
=VAL(K$):RETURN
5200 PRINT@33,CC$;:PRINT@42,"HIT
 ANY KEY";:PRINT@449,CC$;:PRINT@
450,"#";:PRINTUSING"##";K;:PRINT
@458,"RESULT = ";:PRINTUSING"###
";R;:K$=INKEY$
5210 K$=INKEY$:IF K$="" THEN 521
0 ELSE SOUND 150,1:RETURN
6000 CLS:FOR X=1024 TO 1055:POKE
 X,XX:POKE X+480,XX:NEXT:FOR X=1
024 TO 1504 STEP 32:POKE X,XX:PO
KE X-1,XX:NEXT:RETURN
```

Software Review...

VENTURER WILL KEEP YOU ON YOUR TOES

If you have nerves of steel, try *VENTURER*, a new arcade-type game from Aardvark-80.

Written in high-res machine language graphics, this program presents you with a series of rooms and corridors through which you move. As you enter each room, the screen "expands" to give you a full view of the room.

The rooms contain treasures and monsters. Your mission is to shoot the monsters and pick up the treasure. There's a catch, though. If you spend too much time in a room, walls will start to form and you may be trapped.

You get points for each monster shot and for each treasure. You have to kill all the monsters in a room before you can pick up a treasure.

Once you've cleaned out all the rooms on a level, you get to advance to the next. There are 63 levels.

You get three warriors to start and can earn more. You'll probably need them. The barricades which form in the rooms also appear in the corridors after you make enough progress.

This offering from Aardvark (2352 S. Commerce, Walled Lake, MI, 48088, $19.95) is of good quality and has fine color and sound. Our only complaint is that your warrior is only a small dot while it is moving though the corridors, but that is a minor problem in a game which is full of fun and easy to play.

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Using this system to run FLEX and OS-9 has many advantages. First, it gives you 48K from zero right up to FLEX. This means that *ALL* FLEX compatible software will run with *NO MODIFICATIONS* and *NO PATCHES!* There are no memory conflicts because we moved the screen up above FLEX which leaves the lower 48K free for user programs.

What you end up with is 48K for user programs, 8K for FLEX and another 8K above FLEX for the screens and stuff. We have a multi screen format so you can page backward to see what scrolled by and a Hi-Res screen that will enable us to have 24 lines by 42 character display is on the way. That's better than an Apple!

We also implemented a full function keyboard, with a control key and escape key. All ASCII codes can now be generated from the Color Computer keyboard!

We also added some bells and whistles to Radio Shack's Disk system when you're running FLEX or OS-9. We are supporting single or double sided, single or double density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 3 select for side select. When you are running the Radio Shack disk, it will work with the double sided drives but it will only use one side and only 35 tracks. Using 80 track drives is okay, but will not be compatible with standard Radio Shack software. You can also set each drive's stepping rate and drive type. (SS or DS - SD or DD)

In case you don't understand how this works, I'll give you a brief explanation. The Color Computer was designed so that the roms in the system could be turned off under software control. In a normal Color Computer this would only make it go away. However, if you put a program in memory to do something first (like boot in FLEX or OS-9), when you turn off the roms, you will have a full *64K RAM* System with which to run your program.

Now, we need the other half of the 64K ram chips to work, and this seems to be the case most of the time, as the article states. Of course, you could also put 64K chips in.

Some neat utilities are included.

MOVEROM moves Color Basic from ROM to RAM. Because it's moved to RAM you can not only access it from FLEX, you can run it and even change it!! You can load Color Computer cassette software and save it to FLEX disk. Single Drive Copy, Format and Setup commands plus an online help system are included.

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Tutorial...

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GETTING MORE FROM PMODE 4

By H. Allen Curtis

Radio Shack's Color Computer manual, *Going Ahead with Extended Color BASIC*, provides the following information about PMODE 4: PMODE 4 has the highest graphics screen resolution with a grid size of 256 x 192. PMODE 4 requires four video pages and is a 2-color combination mode. It has two color sets, Ø and 1. Set Ø is given as black and green but it is actually dark green and green. Set 1 is black and buff.

The purpose of this article is to demonstrate that PMODE 4 has six OTHER color sets, two of which are 2-color combinations and four are 4-color combinations. Several very short programs will be used to establish the existence of these additional color combinations. To get the full benefit of the presentation and discussion of each program the reader should key in the program and run it.

The program in Listing 1 proves the existence of the 2-color combination, buff and orange, for PMODE 4. In that listing, line 1Ø clears the screen to cyan in color set 1 of PMODE 3. Line 2Ø is a delay to keep cyan on the screen.

Listing 1

```
1Ø PCLEAR4:PMODE3:PCLS2:SCREEN1,1
2Ø FORI=1TO5ØØ:NEXT
3Ø PMODE4
4Ø FORC=ØTO8:PCLSC:FORI=1TO5ØØ:NEXT:NEXT
```

Line 3Ø switches from PMODE 3 to PMODE 4. LINE 4Ø successively clears the screen to the colors in PMODE 4 corresponding to the full set of color numbers, Ø through 8. The colors are seen to be buff for all even numbers and orange for all the odd numbers. Thus, it has now been proved that PMODE 4 does, indeed, have the 2-color combination, buff and orange.

Changing SCREEN1,1 to SCREEN1,Ø in line 1Ø and then running the altered program proves that PMODE 4 also has the 2-color combination, green and red.

The program of Listing 2 shows that for the green and red color combination PMODE 4 has a higher resolution than does PMODE 3. Hence, it shows that the resolution of PMODE 4 has not been diminished for the "new" 2-color combination.

Listing 2

```
1Ø PCLEAR4:PMODE3:PCLS4:SCREEN1,Ø
2Ø CIRCLE(38,96),3Ø,2,3
3Ø PMODE4
4Ø CIRCLE(138,96),3Ø,2,3
5Ø GOTO5Ø
```

Line 1Ø of Listing 2 clears the screen to red in the color set Ø of PMODE 3. Line 2Ø draws in PMODE 3 an ellipse outlined in yellow. Line 3Ø switches to PMODE 4. Line 4Ø draws in PMODE 4 a FINER ellipse outlined in green. The fact that the latter ellipse is more finely drawn demonstrates that PMODE 4 has a higher resolution than PMODE 3. Changing SCREEN1,Ø to SCREEN1,1 in line 1Ø of Listing 2 and running the program shows for the buff and orange color combination that PMODE 4 also has a higher resolution than PMODE 3.

The program of Listing 3 indicates that one can use DRAW, PAINT, GET, PUT and LINE for the "new" 2-color combinations in the same manner as for the "old" ones.

Listing 3

```
1Ø PCLEAR4:PMODE3:PCLS:SCREEN1,1
2Ø PMODE4
3Ø DIMA(21)
4Ø DRAW"BM5Ø,5ØE2ØF2ØL4Ø"
5Ø PAINT(7Ø,4Ø),1,1
6Ø GET(5Ø,3Ø)-(9Ø,5Ø),A,G
7Ø PUT(1ØØ,145)-(22Ø,165),A,PSET
8Ø LINE(1Ø,8Ø)-(3Ø,14Ø),PSET
9Ø LINE(5Ø,8Ø)-(7Ø,14Ø),PSET,BF
1ØØ GOTO1ØØ
```

Line 1Ø clears the screen to buff in PMODE 3. Line 2Ø switches to PMODE 4. Line 3Ø is used in conjunction with GET and PUT of lines 6Ø and 7Ø. Line 4Ø draws a triangle and line 5Ø paints the triangle orange. Lines 6Ø and 7Ø send a replica of the painted triangle to another portion of the screen. Line 8Ø uses LINE to draw a slanted line. Finally, line 9Ø draws an orange rectangle. Replacement of SCREEN1,1 with SCREEN1,Ø and running the program shows that the statements DRAW, PAINT, GET, PUT and LINE work for the color combination, green and red, in the same manner as they do for buff and orange.

The program of Listing 3 is far from exhaustive and certainly does not show that the aforementioned statements will work properly for all possible situations. If such a program could be written, it would be prohibitively long for this article.

In summary, the programs of

(Continued on Page 44)



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PMODE4 (From Page 42)

Listings 1, 2 and 3 show that PMODE 4 has two additional color combinations at the highest resolution and that the Color Computer graphics statements appear to work properly with these sets.

It will be shown shortly that PMODE 4 has four 4-color combinations. For the sake of brevity they will be referred to as color sets A, B, C and D. The sets are as follows:

A. Green, yellow, blue and red
B. Buff, cyan, magenta and orange
C. Dark green, medium green, gray and green.
D. Black, orange, cyan and buff

Color sets C and D were previously brought to public notice by Jack Swindell in the January 1982 issue of *Chromasette Magazine*.

The program of Listing 4 serves to demonstrate that PMODE 4 has the color set A.

Listing 4

```
10 PCLEAR4:PMODE3:PCLS:SCREEN1,0
20 FORC=2TO4:COLORC,1
30 LINE(C*64-64,0)-(C*64,191),PSET,BF:NEXT
40 PMODE4
100 GOTO100
```

Line 10 of Listing 4 clears the screen to green in PMODE 3. Lines 20 and 30 draw colored "boxes" that divide the screen into four equally sized sections which are from left to right green, yellow, blue and red. Line 40 switches to PMODE 4. The four colors remain unchanged on the screen. Therefore, PMODE 4 does, indeed, have the color set A.

Replacing SCREEN1,0 with SCREEN1,1 in line 10 and running the program shows that PMODE 4 also has the color set B.

To prove that PMODE 4 has the color set C add the following line to the program of Listing 4 and then run it:

```
50 SCREEN1,0
```

Changing SCREEN1,0 to SCREEN1,1 in line 50 and running the altered program similarly demonstrates that PMODE 4 has the color set D.

There are limitations on the use of the color sets A, B, C and D. For instance, A, B, C and D are fundamentally the 2-color sets, green and red, buff and orange, dark green and green, and black and buff, respectively. Hence, one must use only colors from the 2-color sets to outline and paint all drawn geometric figures. Other limitations will be brought out in ensuing programs.

Consider the program of Listing 5

Listing 5

```
10 PCLEAR4:PMODE3:PCLS:SCREEN1,0
20 FORCE=2TO4:COLORC,1
30 LINE(C*64-64,0)-(C*64,191),PSET,BF:NEXT
40 PMODE4
50  FORX=30TO225STEP64:CIRCLE(X,96),25:NEXT:CIRCLE(X-64,96),
25,2
100 GOTO100
```

which is a replica of the program of Listing 4 except for line 50. The purpose of line 50 is to draw circles in the four differently colored sections of the screen. It is found to be successful in drawing COMPLETE circles only in the green and red sections, the colors belonging to one of the 2-color combinations of PMODE 4. When SCREEN1,0 is changed to SCREEN1,1 in line 10, it is seen that circles can be drawn in their entirety only on buff and orange, but not on cyan or magenta.

PAINTing is radically different when colors besides those belonging to one of the 2-color sets of PMODE 4 are on the screen. The illustration of this fact is facilitated by adding the following line to the program of Listing 5 in its original form:

```
60 PAINT(10,150),1,1
```

Before running the amended

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program, one would have reason to predict that, except for the interior of the leftmost circle and the outline of the rightmost circle, all the screen would be painted red. This is not the case. The running of the program shows that painting is stopped surprisingly enough at the yellow boundary.

Another surprise occurs when the program is run when the coordinate 10 in line 60 is changed to 75. With this change, painting might be expected to occur in the yellow section of the screen. However, no painting whatsoever occurs when the program is run. Next, try running the program with the coordinate 75 changed to 100. Painting should still be expected to occur in the yellow section. Running the program now shows that merely a vertical line extending from the bottom of the yellow section to the circle is "painted" on the screen.

The examples given should be sufficient to establish the unpredictability of PAINTing when there are present colors not in the 2-color sets of PMODE 4.

The LINE, GET and PUT statements seem to work as expected for the 4-color sets of PMODE 4. Of course, LINE can only use colors from a PMODE 4 2-color set. In the case of GET and PUT, whatever the color or colors graphics figure is can apparently be moved precisely as it would for a 4-color combination of PMODE 3. The reader may find it worthwhile to devise short programs to test LINE, GET and PUT statement usage with the color sets A, B, C and D of PMODE 4.

Based on the findings already decribed, the following procedure is recommended when using the color sets A, B, C and D:

1) If any "fine" (high resolution) drawings are required, restrict their colors to those in a 2-color set.

2) Do as much drawing and painting in PMODE 3 as possible before switching to PMODE 4.

3) Generally, confine all fine drawings and their painting to sections of the screen on which the colors belong to a 2-color set.

4) Feel free to use GET and PUT for animation in PMODE 4.

It might be said that the 4-color sets discussed thus far are indirect color sets of PMODE 4 because programming in PMODE 3 must precede that in PMODE 4. Two of the sets, C and D, can be obtained directly, that is, without recourse to PMODE 3 usage. The program of Listing 6 is used to prove that the sets C and D can be directly derived.

Listing 6

```
10 PCLEAR4:PMODE4:PCLS:SCREEN1,0
20 DRAW"BM20,50D20R2U20R2D20"
30 DRAW"BM21,80D20R2U20R2D20"
40 GOTO40
```

Line 10 of Listing 6 clears the screen to dark green in PMODE 4's 2-color set, dark green and green. Each of line 20 and 30 draws a colored rectangle on the screen. One of the rectangles is gray and the other is medium green. When SCREEN1,0 of line 10 is changed to SCREEN1,1 and the program run, rectangles colored cyan and orange are observed to be drawn. Thus, the sets C and D have been obtained without a prior use of PMODE 3.

There is a yet-to-be-solved mystery associated with the direct sets C and D of PMODE 4. The mystery is this: Suppose a program is written in which X objects are drawn in cyan and Y objects in orange. The next time this program is loaded and run the X objects MAY be orange and the Y objects cyan. Sometimes this color change can be achieved by a repeated depressing of the RESET button and then running the program again. Whether an object is drawn as gray or medium green of set C or as cyan or orange of set D appears to depend on the current state of some input/output circuit.

(Continued on next page)

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PMODE4 (From Page 45)

In the program of Listing 6 the rectangle of line 20 will always be in a color different from the rectangle of line 30 regardless of the current state of the input/output circuitry of the Color Computer. The fact that the leftmost horizontal coordinate of the drawing of line 20 is an even number and that of line 30 is odd is the determining factor in assuring a color difference. In lines 20 and 30 each of the drawings spans 5 points horizontally. Every other one of these points is drawn. Drawing ever other point is what yields one fo the colors cyan, orange, gray or medium green.

The program of Listing 7 demonstrates that all lines, having even leftmost points and every other point drawn, are of the same color.

Listing 7

```
10 PCLEAR4:PMODE4:COLOR0,1:PCLS:SCREEN1,1
20 X=RND(255):Y=RND(191):Z=X+RND(255)
30 IFX/2>INT(X/2)THENX=X-1
40 LINE(X,Y)-(X,Y),PSET
50 X=X+2:IFX(Z AND X(256THEN40
60 FORI=1TO500:NEXT:PCLS:GOTO20
```

Line 10 of the listing clears the screen to buff and makes the foreground color black. Line 20 sets random coordinates: X is a random horizontal coordinate, Y a random vertical coordinate, and Z a random coordinate determining the end of the line to be drawn by lines 40 and 50. Line 30 makes X even. Lines 40 and 50 draw a line of which only its even points are drawn. Line 60 supplies a delay before clearing the screen to buff again and returning to line 20. Running the program shows that all lines drawn on the screen are of the same color, orange or cyan.

If the relation > in line 30 is replaced by = then lines 40 and 50 will draw a line having only its odd points drawn. Running the changed program produces lines that are all colored cyan (or orange) if previously the program drew orange (cyan) lines.

The program of Listing 8 illustrates how a geometric figure can be drawn, painted and moved using the direct color set D of PMODE 4.

Listing 8

```
10 PCLEAR4:PMODE4:COLOR0,1:PCLS:SCREEN1,1
20 A=1:B=126:X=B:Y=96:Z=1
30 LINE(X,Y)-(X,Y),PSET
40 X=X+2:Z=Z+1:IFZ<=A THEN30
50 A=A+2:B=B-2:X=B:Y=Y+1:Z=1:IFB>100THEN30
60 DIMC(15)
70 GET(102,96)-(150,108),C,G
80 FORI=1TO60:NEXT
90 PUT(202,15)-(250,27),C,PSET
100 FORI=1TO600:NEXT
110 PUT(33,126)-(81,138),C,PSET
120 GOTO120
```

Line 10 of the listing clears the screen to buff and makes the foreground color black. Line 20 initializes control variables A, B and Z as well as the coordinate variables X and Y. Lines 30, 40 and 50 draw a triangle that is painted orange or cyan. Lines 60 through 90, with a short delay, copy the triangle at another part of the screen. Lines 100 and 110, with another delay, copy the triangle, but with a color change, at another portion of the screen. Because it is already known how to draw, paint and move black objects in PMODE 4, the program concentrates on the colors cyan and orange.

Note that the triangle of lines 30, 40 and 50 has only its even horizontal coordinates drawn. When it is moved to a location in which those coordinates are still even, the triangle retains its original color. However, if the location is such that those coordinates are odd, the triangle changes color. In general, a move that preserves the evenness or oddness of the horizontal coordinates of a drawn object will also preserve the color.

It is hoped that the presentation of this article with demonstrative programs will stimulate the reader towards getting more color out of PMODE 4.

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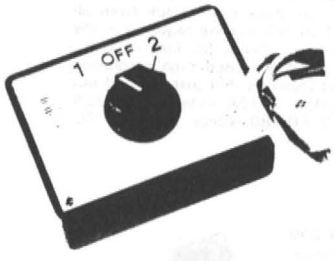
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Here are a few tips to help you out:

Make sure that you copy every line exactly as it appears. Every month we receive phone calls from readers who have made typographical errors in entering the lines.

This game does not require the CPU speed up. It is fast enough without it. If you wish, you may include POKE65495,0 if you wish the game to be even faster. (This might help during title cards which do stay on rather long while the complex graphics are being drawn.)

Make sure you save the program to tape before trying a speed-up with CSAVE"SWAMPWRS".

As with all the IBM games shown in *the RAINBOW*, this game is for your own use, and may not be reproduced for any other purpose without permission.

```
1 CLEAR500:DIM M(17):C=2:CLS0:P$
=CHR$(128):FORI=2TO14:FORJ=4TO13
:SET(J,I,C):NEXTJ:NEXTI
2 C=8:FORK=0TO11STEP11:FORJ=18TO
23:SET(J+K,2,C):NEXTJ:FORJ=17TO2
4:SET(J+K,3,C):NEXTJ:FORI=4TO14:
FORJ=16TO25:SET(J+K,I,C):NEXTJ:N
EXTI:NEXTK
3 C=7:FORK=0TO7STEP7:FORJ=39TO58
:FORI=2TO7:SET(J,I+K,C):NEXTI:NE
XTJ:FORI=3TO6:SET(59,I+K,C):NEXT
I:FORI=4TO5:SET(60,I+K,C):NEXTI:
NEXTK
4 FORY=1TO28:READA:IL$=IL$+CHR$(
A):NEXT
5 FORS=1TO28:FORU=15TO8STEP-1:IF
U=15THEN6ELSEPRINT@(U+1)*32+15-2
8/2+S,P$;
6 PRINT@U*32+15-14+S,MID$(IL$,S,
1);:NEXTU,S
7 FORY=1TO22:READA:BG$=BG$+CHR$(
A):NEXT
8 FORS=1TO22:FORU=15TO10STEP-1:I
FU=15THEN9ELSEPRINT@(U+1)*32+4+S
,P$;
9 PRINT@U*32+4+S,MID$(BG$,S,1);:
NEXTU,S
10 FORY=1TO28:READA:FD$=FD$+CHR$
(A):NEXT
11 FORS=1TO28:FORU=15TO12STEP-1:
IFU=15THEN12ELSEPRINT@(U+1)*32+1
+S,P$;
12 PRINT@U*32+1+S,MID$(FD$,S,1);
:NEXTU,S
13 FORY=1TO18:READA:DH$=DH$+CHR$
(A):NEXT
14 FORS=1TO18:FORU=15TO14STEP-1:
IFU=15THEN15ELSEPRINT@(U+1)*32+6
+S,P$;
15 PRINT@U*32+6+S,MID$(DH$,S,1);
:NEXTU,S:SOUND100,3:SOUND50,1
16 DATA105,108,108,117,115,113,1
14,97,116,101,100,128,128,128,10
9,101,109,111,114,121,128,128,12
8,98,97,110,107,115
17 DATA99,111,108,111,114,128,99
,111,109,112,117,116,101,114,128
,103,97,109,101,128,98,121
18 DATA102,114,101,100,128,115,9
9,101,114,98,111,128,128,128,114
,111,98,101,114,116,128,100,111,
98,98,101,114,116
19 DATA97,110,100,128,128,100,97
,108,101,128,104,97,103,103,101,
114,116,121
20 PMODE3,1:PCLS2:SCREEN0,0
21 DRAW"S8BM0,136C1BRUE2ER2ER2EU
E3RERERER2ER6ER11E2R3FR3F2DLNH3R
4FRFRF2NL13D2GL4GL3G2LG3L2GL2G3L
NG2F4R9DGL2GLHL5H4L8H2U3E2R3BU2B
L3L8G2D3F7G2D3FREU2RDFRU3F2RUH3L
U3BL5L5DRGDF2DGLHUGD4GLHU6G2DL2H
UE2U4H2LH2LHUE2"
22 PAINT(2,2),1,1
23 FORI=1TO120:PSET(RND(100),RND
(40)+100,4):NEXT
```

(Continued on next page)

SWAMP WARS (From Page 49)

```
24 DRAW"S4BM0,100C2R255":PAINT(2
,134),3,2
25 CIRCLE(88,110),4,3,.9:M$="NG7
HEHGC4NG4NH9C3EUR2E2U3F3R2C4E7R2
F2DFDND3G3L3NG3BR6DG4L6GDC3F13D2
L2BD4C2H12U4C3NF12H3LD15NF10U10L
2HUL"
26 C=8:CLS0:FORI=0TO14:SET(I,15,
C):NEXT:FORI=6TO14:SET(I,12,C):N
EXT
27 FORI=6TO19:SET(I,9,C):NEXT:FO
RI=18TO27:SET(I,15,C):NEXT
28 DRAW"S4BM0,136C2R20BR50R185BM
0,100C1R255"
29 FORY=9TO13STEP4:FORI=30TO37:S
ET(I,Y,C):NEXTI,Y
30 FORI=36TO41:SET(I,15,C):NEXT:
FORI=40TO49:SET(I,9,C):NEXT:FORI
=48TO53:SET(I,15,C):NEXT:FORY=9T
013STEP4:FORI=52TO60:SET(I,Y,C):
NEXTI,Y
31 FORI=9TO12:SET(6,I,C):SET(7,I
,C):NEXT:FORI=12TO15:SET(13,I,C)
:SET(14,I,C):NEXT
32 FORG=0TO18STEP18:FORY=18TO30+
WW STEP4:FORI=9TO15:SET(Y+G,I,C)
:SET(Y+1+G,I,C):NEXTI,Y:WW=WW+4:
NEXTG
33 FORI=9TO12:SET(59,I,C):SET(60
,I,C):NEXT
34 PAINT(2,134),1,2
35 COLOR3,2:FORI=138TO168STEP2:L
INE(0,I)-(256,I),PSET:NEXT
36 C=3:FORG=0TO17STEP17:FORI=0TO
10:SET(I+G,17,C):NEXTI,G
37 FORI=9TO18:SET(I,23,C):NEXT
38 FORG=17TO20STEP3:FORY=0TO11ST
EP11:FORI=21TO29:SET(I+Y,G,C):NE
XTI,Y,G
39 FORI=28TO31:SET(I,23,C):NEXT:
FORI=38TO51:SET(I,23,C):NEXT
40 FORI=43TO51:SET(I,20,C):NEXT:
FORI=43TO63:SET(I,17,C):NEXT
41 FORI=9TO21STEP4:FORY=17TO23:S
ET(I,Y,C):SET(I+1,Y,C):NEXTY,I
42 FORG=28TO32STEP4:FORI=17TO23:
SET(G,I,C):SET(G+1,I,C):NEXTI,G
43 FORG=39TO43STEP4:FORI=17TO20:
SET(G,I,C):SET(G+1,I,C):NEXTI,G
44 FORG=37TO50STEP13:FORI=20TO23
:SET(G,I,C):SET(G+1,I,C):NEXTI,G
45 FORI=1TO8:READK:POKE1335+I,K:
NEXTI:FORI=1TO5:PLAY"V3103L25GBO
2AC":NEXTI
46 DATA40,3,41,32,49,57,56,50
47 FORI=0TO248STEP4:LINE(I,192)-
(I+6,192-RND(25)),PRESET:NEXT:CO
LOR3,4
48 FORI=6TO256STEP2:LINE(I,192)-
(I-6,192-RND(9)),PRESET:NEXT
49 FORI=0TO248STEP4:LINE(I,192)-
(I+6,192-RND(25)),PRESET:NEXT:CO
LOR3,4
50 FORI=6TO256STEP2:LINE(I,192)-
(I-6,192-RND(9)),PRESET:NEXT
51 DRAW"S6BM232,180C1FRNR8FNR6FR
4EREREU2HUH3LNF4HL2F8L12"
52 FORI=1TO150:PSET(RND(256),RND
(50)+140,RND(3)+1):NEXT
53 CT$="C3U50C4NU14HU12EC3U4RD4C
4ND14FD12GC3D50":DRAW"S6BM4,136"
+CT$+"BE6"+CT$+"BE6"+CT$:DRAW"BM
240,140"+CT$+"BF4BR2"+CT$
54 DRAW"S20BM4,136C2U2HU17D17FU3
EU14D14GD5R2U4EU15D15GD4R2U4ENU1
7":W$="U4NE3NH3":DRAW"S8BM10,123
C2"+W$+W$+W$+W$+W$+W$
55 DRAW"S2BM170,40C3"+M$:GET(160
,32)-(186,56),M,G:COLOR1,1:LINE(
160,32)-(186,56),PRESET,BF:COLOR
4,1:SCREEN1,1
56 BB=RND(8):L=140+(BB*8):CIRCLE
(L,134),3,3,.9,.5,1:CIRCLE(L,134
),3,1,.9,.5,1
57 IFMS=0THEN58ELSE59
58 P=RND(50):IFP>49THENMS=1
59 IFPEEK(339)=255THEN63
60 COLOR4,1:V=INT((JOYSTK(0)+1)/
8):LINE(118,118)-(140+(V*8),133)
,PSET:PLAY"V3101L155BC":LINE-(11
8,118),PRESET
61 IF V=BB THEN62ELSE63
62 SCREEN1,0:PLAY"O2L100GO1L5BD"
:WB=WB+1:SCREEN1,1
63 IFMS=0THEN56
64 PUT(200-Q,30+Q)-(226-Q,54+Q),
M,PSET:Q=Q+4:IFQ<80THEN56
65 LINE(200-Q+8,30+Q-8)-(226-Q+8
,54+Q-8),PRESET,BF:Q=0:MS=0:FORF
=1TO3:PMODE4,1:SCREEN1,1:PLAY"O4
L25GCG":PMODE3,1:SCREEN1,1:NEXTF
66 ML=ML+1:IFML=5THEN67ELSE56
67 PRINT@64," PRESS FIRE BUTTON
FOR NEW GAME":PRINT@448," YOUR F
ROG NABBED";WB;"WATERBUGS"
68 IFPEEK(339)=255THEN68
69 ML=0:WB=0:S=0:SCREEN1,1:GOTO5
6
70 REM 'SWAMP WARS' BY FRED B.
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Software Review...

AUTO RUN WILL GIVE THAT PRO LOOK

Several months ago, *the RAINBOW* carried a letter to the editor asking whether there was any sort of "bootstrap" program available for the 80C -- a program that would, in effect, "start things up" for a progam.

Yes, Virginia, there is *AUTO RUN* and, in a word, it is good!

Available from Sugar Software (2153 Leah Lane, Reynoldsburg, OH, 43068, for $14.95), *AUTO RUN* will load up your programs automatically. No more "CLOAD" and then "RUN." In effect, it duplicates the RUN command in Disk Color Basic, in which you can load a program and tell it to start running at the same time.

This, of itself, would be a fine addition to a software library, and it would be very handy to append *AUTO RUN* to every program you have. But, there is more.

The program also allows you to draw low res graphic screens with title cards for your programs. You can use all the colors and even create extremely nifty borders automatically! You can, of course, easily mix text and graphics on the screen.

Using this option, you can issue one CLOAD command, have your title graphics come on automatically, and then have your program load and run. No other buttons to press.

And, of note to software authors, the price of *AUTO RUN* includes the right to use it with any program you write for sale. That, frankly, is generous.

An outstanding offering.

Software Review...

LOW-RES BIORHYTHM IS COLORFUL

Biorhythms fascinate a lot of people and here is an inexpensive, graphic version of this program which will display a two-week chart on your 80C screen.

Its for the 16K Extended Color version and is available from Color Software Services (P.O. Box 1723, Greenville, TX, 75401, for $7.95).

You simply enter your birthdate and the date you want the chart to start into the 80C. The computer then draws a chart with low-res color blocks for the three cycles -- physical, emotional and intellectual. If the colors overlap, then more than one cycle is present for that particular day.

This version of a popular program isn't as fancy as those which print out on a printer, but it is less expensive and doesn't require anything else to get the full report. If you have a passing interest in biorhythms -- or don't have or want to use a printer -- this version will be more than adequate for your needs.

We found it easy and enjoyable.

PROGRAMS FOR KIDS

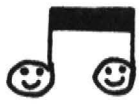
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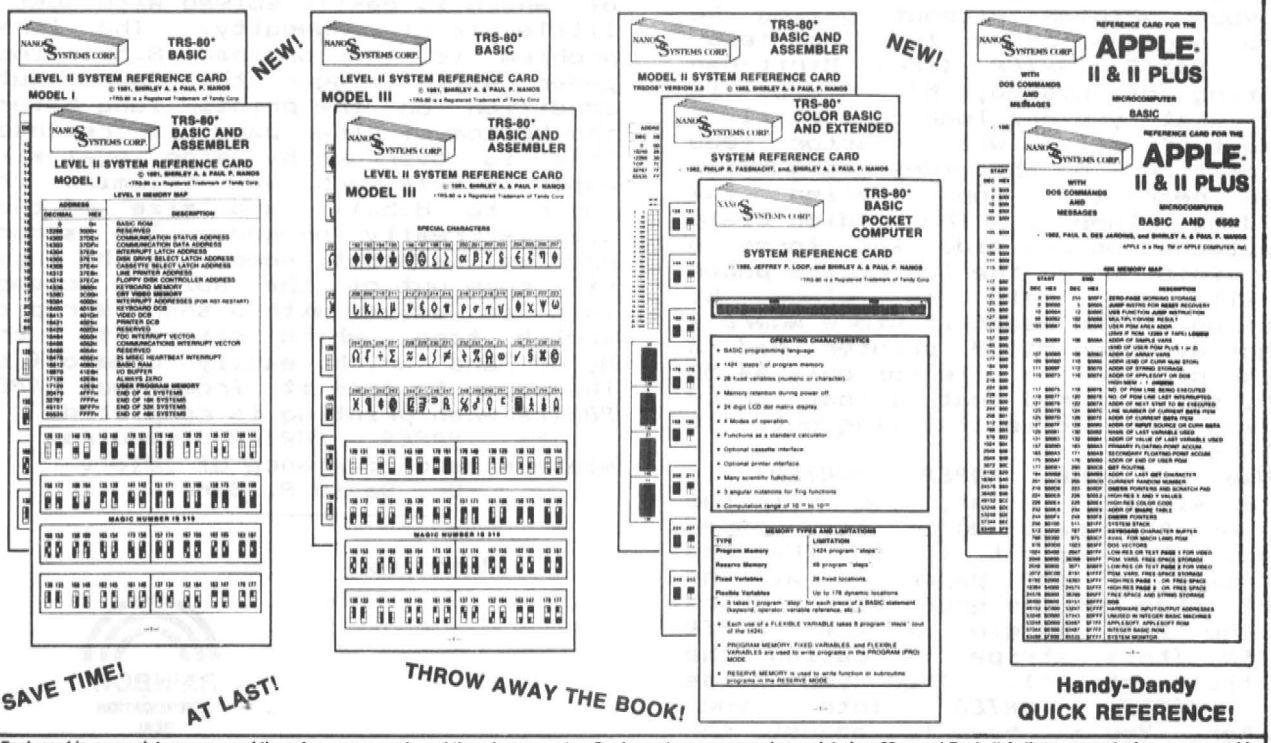
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Review...

PAPER PORTER IS HELPFUL FOR PRINTER

Want to use single sheets of paper in your printer without paying the extra expense of a friction feed? Then *PAPER PORTER* (from Minit-Man Printing of Otsego, MI, 49078) is just what you are looking for! It's a sheet of mylar with tractor feed perforations on the sides and a mylar strip near the top (called the "holding clamp"). The holding clamp is attached on one side and forms a flap into which the top of the paper is slid and held in place by friction. The Heathkit store where I bought my Epson MX-80 printer had a stack of them on sale for only $4.50 each, so I figured that at that price it was worth at least trying out. It works great!

Use of the *PAPER PORTER* is quite simple. First, you slip the top of the page under the paper clamp, then adjust it so that the left side of the paper is at the right side of the green stripe which is the left margin of the *PAPER PORTER* (this stripe is called the "verticle strip"). Then you slide the *PAPER PORTER* into your printer. You may have to adjust the width between the tractors, since the holes are not the same distance apart as the holes on the printer paper I bought from Radio Shack. Then you adjust the roller knob to get the paper set where you want printing to begin. That's all there is to it!

There are two minor problems, each of which is easily solved with just a little bit of ingenuity. The first problem is that ordinary 8.5x11 inch paper will trigger the "paper-out" condition on the printer long before the bottom of the page is reached. This is overcome by using legal-size paper (8.5x14 inch) and trimming the paper to 8.5x11 inch size if that size is really needed. The second problem is that sometimes the paper will come out of the holding clamp. This is solved with a short strip of scotch tape, which sticks to the Mylar and which easily come off of the paper to free it from the *PAPER PORTER* when printing is completed.

The *PAPER PORTER* requires a minimum head clearance of .016".

--Dr. David R. Barr

Look for the...

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™TRS80 color

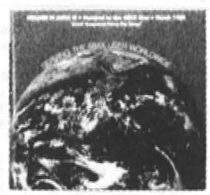
From the January 1981 issue of the CSRA Computer Club newsletter:

> There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

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Currently, and even before the Color Computer™ hit the stores, **68 Micro Journal™** was devoting more space to the TRS-80C Color Computer™ and information concerning the Motorola 6809 (which is the CPU in the Color Computer™) than ANY OTHER Computer Magazine. Examples include:

REVIEWS of the three major Disk Control Systems for the Color Computer™, most of the Monitors, Assemblers, and Disassemblers, Word Processors and Editors, "Terminal" Programs (for use with Modems, Communications with other Computers, etc.), and of course, Games.

HINTS for Expanding Memory, Power Supply Cooling, repairing sticky keyboards, disabling the ROM PAK "Take Over", hooking up to Printers, etc.

DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer™ with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

I suggest that you subscribe to **68 Micro Journal™**, SOON, as many back issues are sold-out.

We still, and will continue to, lead in the type information you need to **FULLY UTILIZE** the **POWER of the 6809 in the Radio Shack TRS-80 Color Computer™**.

Bob Nay
Color Computer Editor

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THE ULTIMATE IN COLORCOMPUTING

WORD PROCESSING

THE SUPER "COLOR" WRITER II

The Word Processor that re-wrote the book on Word Processing

The **Super "Color" Writer** is a FAST, machine code, full featured, character (screen) oriented word processing system for the TRS-80(TM) Color Computer and ANY printer. The video display is styled after a professional phosphor (green characters on black background) display for hours of use without eye fatigue (optional orange on black). The unique print WINDOW frees you from 32, 51 or 64 character lines FOREVER! This window can be moved anywhere in the text file, up, down, left or right to display the text as it will be printed without wasting paper. You can create or edit **Super "Color" Terminal** files, ASCII files, BASIC programs or Editor/Assembler source listings. It's simple enough for beginners with 4K and...for the professional writer with a 32K disk system and a lot to say, there's plenty of room to say it!

COMPARISON CHART	SUPER COLOR WRITER			THE COMPETITION		
System Size	4K	16K	32K	4K	16K	32K
TAPE Text space	N/A	8K	24K	N/A	2K	18K
ROMPAK Text space	2.5K	15K	31K	N/A	N/A	N/A
DISK Text space	N/A	6.5K	22.5K	N/A	0.5K	16.5K
Right Justify		YES			NO	
Video Window		YES			NO	
Edit any ASCII File		YES			NO	

The figures speak for themselves and with professional features like PROGRAMMABLE function string commands to perform up to 28 commands automatically, PROGRAMMABLE text file chaining, PROGRAMMABLE column insert & delete, and right hand JUSTIFICATION with punctuation precedence, the choice is clear but there's still more!

The **Super "Color" Writer** takes full advantage of the new breed of "smart printers" with Control codes 1-31, 20 Programmable control codes 0-255 for special needs and built in Epson MX-80, Centronics 737, 739 and R.S. Line Printer IV, VII, VIII drivers.

CHECK THESE FEATURES!!

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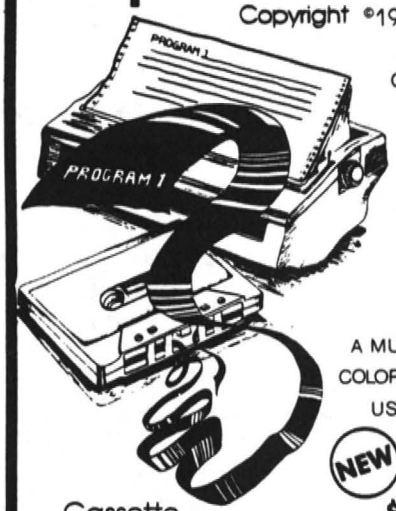
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The Quality Continues . . .

Utility...

A DATA FILE TO STORE ALL YOUR INFORMATION

By Jorge Mir
Rainbow Utilityman

This month's utility is called *UNIDATFL*, and, as the name infers, it is a very flexible data file system which can be used to store information in any kind of format chosen by the user.

The program begins with a menu at which you can choose to add data, search for it, print it or even sort it.

When data is to be added, the program asks whether the information is to be stored on a cassette or disk file or if it is to be entered from the keyboard.

If you want to add data from a cassette file, the program asks for the file name. At this time you should have the cassette recorder ready, meaning with the play button depressed and a clean tape wound past the leader. This is necessary because after the file name is entered, the program will begin to search for and load the named file.

If the file you want loaded is stored on a disk, you should have the disk in the disk drive. After you indicate the file is on the disk, the program will search the disk directory and print all file names with a "DAT" extension to aid you in the proper identification of the file to be loaded.

New data is entered by indicating you want to use the keyboard. The program searches for the first available memory space so it can store new data input from the keyboard. Data can be added at any time, whether or not a file has already been loaded into memory.

The information should be typed in the same format you wish to see it when searching for it. The <ENTER> key should be pressed at the end of each line. Once all data for a specific item is entered, you indicate so by typing an up arrow. You are then given a chance to edit any portion of the data before processing.

The editing is done by typing in the data you want to delete and adding the corrected data.

An up arrow is also used to exit from the keyboard input routine and to return to the main menu.

Once data is loaded into memory, you can search for it by indicating any keyword(s) contained in the specific data information to be searched and displayed on the screen. Please note that if the same keyword is contained in other stored data, that data will also be printed on the screen.

After the selected item is printed on the screen, you are given some choices: You can add additional data to the item, edit any portion of the item. output it to a printer, or delete it from the file. You also have the choice of returning to the main menu or continuing to search for additional data containing the same keyword(s). The program indicates when you reach the end of the file and then returns to the main menu.

If you choose the print routine from the main menu, all data contained in the file is sent to a printer. You can stop the printer at any time by typing an "S". The program checks to see whether your printer is ready before it proceeds. If the printer is not ready, a message is printed to indicate you need to take action -- usually turn it on or to place the "on line" switch to on.

The stored data can also be sorted alphabetically by choosing the sort routine from the main menu. You should note that items are stored as a continuous string, so the sort routine sorts the entire string alphabetically. If any item has more than 255 characters, the excess characters are stored in the following memory space. However, the sort routine does not work properly in such instances, since the second memory location is interpreted by the program as a separate item and sorted accordingly. While the file is being sorted, the number of passes -- or times the program goes through the file -- is indicated. This step was added because, at times when a large amount of data must be sorted, a sort takes some time. This will allow the user to know that processing is, indeed, taking place.

Once you are through working with a file, you can exit the program. Before it ends, *UNIDATFL* asks whether you wish to save your information. If you choose to do so, the program then asks whether you want data daved to tape or disk and requests you to type in a file name under which you wish to store the data. If the program is to be stored to disk, the program checks to see whether there is already a file by that name on the disk. If there is one, it KILLs it before storing the file contained in memory.

(Continued on next page)

FILE (From Page 57)

UNIDATFL is very flexible and can be used as a data bank for names and addresses, recipies, collection lists (coins, stamps, etcetera), tax data, checks, "to-do" lists and the like. In fact, there are practically no limitations as to the type of data it can handle in an effiocient manner. The amount of data which can be stored is limited, of course, by the memory of your computer.

16K ECB




```
1 GOTO 4000
2 DATA BD,B3,ED,1F,02,7E,96,A7
10 '      **** DATAFILE ****
20 '         BY: JORGE MIR
30 '
40 '    CHANGE STEP 60 ACCORDING
       TO RAM SPACE AVAILABLE
50 '
51 FOR I=0TO7:READE$:NEXT:FORI=0
TO18:READE$
52 E=VAL("&H"+E$):POKEI+&HE02,E:
NEXT
53 DATA 8E,04,00,A6,80,81,60,2D,
04,80,40,A7,1F,8C,06,00,2D,F1,39
54 DEFUSR0=&HE02
60 CLEAR 18000:D=500:DIM N$(D)
70 GOSUB 3500
100 GOSUB 5000
105 I$=INKEY$:IF I$=""THEN105
110 IF I$="A" THEN 290
120 IF I$="F" THEN 530
130 IF I$="P" THEN 1530
140 IF I$="S" THEN  1760
150 IF I$="E" THEN 990
160 SOUND 100,2:GOTO 105
290 GOSUB3000:X=0
310 IF TY=1 OR TY=-1 THEN 860
320 CLS:PRINT"(TYPE '^' WHEN DON
E OR TO EXIT)":PRINT STRING$(32,
"-")
330 X=X+1:IF N$(X)="" THEN 340 E
LSE 330
340 N=1
350 LINE INPUT I$:IF I$<>"^" THE
N 380
360 IF F=0 THEN 480
370 GOTO 70
380 N=N+1
390 IF LEN(N$(X))+LEN(I$)=>250 T
HEN 410
400 N$(X)=N$(X)+CHR$(13)+I$:GOTO
 350
410 N$(X)=N$(X)+"*"
420 IF N$(X+1)=""THEN470
430 Y=X
440 Y=Y+1:IF N$(Y)<>""THEN440
450 N$(Y)=N$(Y-1):Y=Y-1
460 IF Y=X THEN 470 ELSE 450
470 X=X+1:N$(X)=CHR$(13)+I$:GOTO
 350
480 IF N=1 THEN 70
490 PRINT"IS ABOVE DATA CORRECT
(Y/N)?":GOSUB 1150
500 IF I$<>"N" THEN 320
510 GOSUB 1410
520 GOTO 580
530 PRINT @384,"key word(s):";:X
=USR(0)
540 LINEINPUT K$
550 X=0:SOUND200,2:PRINT@490,"se
arching file";:Z=USR(0)
560 X=X+1:IF X=D+1 OR N$(X)="" T
HEN 780
570 IF INSTR(N$(X),K$)=0 THEN 56
0
580 SOUND150,1:CLS0:PRINT @480,"
functions: a  c  d  s  p  ?";:Z=
USR(0)
590 PRINT @0,"";
600 N=INSTR(N$(X),"J"):IF N=0 GO
TO 620
610 MID$(N$(X),N,1)=CHR$(13):GOT
O 600
620 N=INSTR(N$(X),"*"):IF N=0 TH
EN 650
630 PRINT LEFT$(N$(X),X-1)
640 X=X+1:GOTO 620
650 PRINT N$(X)
660 IF I$<>"N" THEN 690
670 IF INKEY$="" THEN 670
680 PRINT:PRINT:GOTO 490
690 GOSUB 1150:F=0
700 IF I$="D" THEN 800
710 IF I$="S" THEN 70
720 IF I$="C" THEN F=1:GOSUB 141
0
```

(Continued on Page 61)

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TELEWRITER

Telewriter is the powerful word processor designed specifically for the Color Computer. It can handle almost any serious writing job and it is extremely easy to use. It has all the advanced features you need to create, edit, store, format and print any kind of text. With Telewriter you can quickly produce perfect, finished copy for letters, reports, term papers, articles, technical documentation, stories, novels, screenplays, newsletters. It is also a flexible and efficient way to take notes or organize ideas and plans.

51 x 24 DISPLAY

The Color Computer is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required.** By using software alone, Telewriter creates a new character set that has **real lower case letters**, and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the Color Computer's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, the beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

. . . one of the best programs for the Color Computer I have seen . . .
— Color Computer News, Jan. 1982

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins; line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in the text.

. . . truly a state of the art word processor . . . outstanding in every respect.
— The RAINBOW, Jan. 1982

Telewriter will automatically number pages (if you want) and automatically center lines. It can chain print any number of text files from cassette or disk without user intervention. You can tell it to start a new page anywhere in the text, pause at the bottom of the page, and set the Baud rate to any value (so you can run your printer at top speed).

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with **any** printer. There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE AND DISK I/O

Because Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape. The Verify command checks your cassette saves to make sure they're good. You can save all or any part of the text buffer to disk or cassette and you can append pre-existing files from either medium to what you have in the buffer already.

AVAILABLE NOW

Telewriter turns your Color Computer into the lowest cost hi-power word processor in the world today. It runs in 16K or 32K (32K recommended) and is so simple you can be writing with it almost immediately. It comes with 63 pages of documentation and is fully supported by Cognitec. Telewriter costs $49.95 including shipping (California residents add 6% tax). To order, specify disk or cassette and send check or money order to:

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FILE (From Page 58)

```
730 IF I$="P" THEN GOSUB 1190
740 IF I$="?" THEN GOSUB 1290
750 IF I$<>"A" THEN 770 ELSE PRI
NT
760 PRINT"SECTION TO BE ADDED:":
GOTO 350
770 PRINT @17,"SEARCHING FILE":G
OTO 560
780 SOUND 200,5:CLS0:PRINT@195,"
  <no more data on file>":Z=USR
(0)
790 GOSUB 1150:GOTO 70
800 N$(X)="":PRINT STRING$(32,CH
R$(128));:PRINT"ITEM DELETED FRO
M FILE"
810 SOUND150,1:PRINT"(STANDBY WH
ILE FILE IS UPDATED)"
820 FOR XX=X TO D-1
830 N$(XX)=N$(XX+1):NEXT XX
840 X=X-1
850 GOTO 560
860 IF TY=1 THEN GOSUB 3050
870 GOSUB 1170:FL$=I$
880 N=0
890 OPEN"I",#TY,I$
900 N=N+1
920 INPUT#TY,N$(N)
930 X=INSTR(N$(N),"]"):IF X=0 GO
TO 960
940 MID$(N$(N),X,1)=CHR$(13)
950 GOTO 930
960 IF EOF(TY)=0 THEN 900
970 CLOSE#TY
980 GOTO 70
990 PRINT@384,"do you want to sa
ve data (y/n)";:X=USR(0)
991 I$=INKEY$:IF I$=""THEN 991
992 IF I$="N" THEN CLS:END
994 IF I$="Y" THEN PRINT @384,ST
RING$(32," ");:GOTO1010
1000 GOTO 70
1010 GOSUB3000:GOSUB 1170
1030 N=0:IF TY=1 AND FL$=I$ THEN
 CLS0:SOUND150,1:PRINT@7*32+5,"o
ld file being erased":X=USR(0):!
FL$+"/DAT"
1035 CLS0:SOUND150,1:PRINT@7*32+
5,"new file being created":X=USR
(0)
1036 X=0
1037 X=X+1:IF N$(X)<>""THEN1037
1040 OPEN"O",#TY,I$
1050 N=N+1
1060 IF N$(N)="" THEN 1130
1070 Y=INSTR(N$(N),CHR$(13)):IF
Y=0 THEN 1100
1080 MID$(N$(N),Y,1)="]"
1090 GOTO 1070
1100 IF TY<>1 THEN 1115 ELSE ! #
1,N$(N)
1110 GOTO1050
1115 PRINT#-1,N$(N)
1120 GOTO 1050
1130 CLOSE#TY
1140 GOTO 70
1150 I$=INKEY$:IF I$="" THEN 115
0
1160 I=VAL(I$):RETURN
1170 PRINT:PRINT@448,"    file n
ame: ";
1171 Z=USR(0):PRINT "        ";
1172 PRINT @463,"";:LINE INPUT I
$
1175 IF I$=""THEN70
1180 Z=USR(0):RETURN
1190 CLS:GOSUB 1650:IF I=1 THEN
1220
1200 PRINT@230,"PRINTER IS NOT R
EADY":SOUND 100,5
1210 GOSUB 1150:GOTO580
1220 Y=INSTR(N$(X),"*"):IF Y=0 T
HEN 1260
1230 PRINT LEFT$(N$(X),Y-1):PRIN
T:PRINT#-2,LEFT$(N$(X),Y-1)
1240 PRINT#-2,"":PRINT#-2, STRIN
G$(32,"*")
1250 X=X+1:GOTO 1220
1260 PRINT N$(X):PRINT:PRINT#-2,
N$(X)
1270 PRINT#-2,"":PRINT#-2,STRING
$(32,"*")
1280 RETURN
1290 CLS(0):PRINT" key letters:"
1300 PRINT:PRINT "   a = add dat
a"
1310 PRINT"   c = correct data"
1320 PRINT"   d = delete listing
"
1330 PRINT"   s = stop search"
1340 PRINT"   p = print data"
1350 PRINT"   ? = prints this li
st"
1360 PRINT:PRINT " <space bar> c
ontinues search"
1370 X=X-1
1380 PRINT@480," <press any key
to continue>";:Z=USR(0)
1390 IF INKEY$="" THEN 1390
1400 RETURN
1410 PRINT:PRINT"ENTER DATA TO B
E CHANGED:"
1420 LINE INPUT D1$
1430 D1=INSTR(N$(X),D1$)
1440 IF D1=0 THEN 1410
1450 PRINT"ENTER CORRECTED DATA:
"
1460 LINE INPUT D2$
1470 D2=LEN(D1$)
1480 C1$=LEFT$(N$(X),D1-1)
1490 C2$=MID$(N$(X),D1+D2)
1500 N$(X)=C1$+D2$+C2$
1510 IF I$="C" THEN X=X-1
1520 RETURN
1530 GOSUB 1650:IF I=1 GOTO 1560
1540 PRINT@485,"PRINTER IS NOT R
EADY";
1550 SOUND 150,5:FOR X=1TO500:NE
XT X:GOTO70
1560 PRINT@483,"PRESS 'S' TO STO
P PRINTING";
1570 SOUND 100,5:FOR X=1 TO 500:
NEXT X
1580 X=0
1590 X=X+1: IF X=D+1 GOTO 1640
1600 IF N$(X)=""THEN 1640
1610 IF INKEY$="S" THEN 1640
1620 GOSUB 1190
1630 GOTO 1590
1640 GOTO 70
1650 REM***IS PRINTER READY?
1660 IF PEEK(65314)/2=INT(PEEK(6
5314)/2) THEN I=1 ELSE I=0
1670 RETURN
1680 REM **** SET CALENDAR***
1690 M$="JAN31FEB28MAR31APR30MAY
31JUN30JUL31AUG31SEP30OCT31NOV30
DEC31"
1700 Z=0:FOR Y=0 TO 11
1710 FOR X=1 TO VAL(MID$(M$,Y*5+
4,2))
1720 N$(X+Z)="]"+STR$(X)+" "+MID
$(M$,Y*5+1,3)+" 1981"
1730 NEXT X: Z=Z+X-1
1740 NEXT Y
1750 GOTO 70
1760 PRINT:PRINT:PRINT"data bein
g sorted, please wait":Z=USR(0)
1770 N=0
1780 N=N+1
1790 IF N$(N)<>"" THEN 1780
1800 REM****SORTING ROUTINE****
1810 FOR S1=1 TO N-1 STEP 2
1820 S2=S1+1
1830 NEXT S1
1840 S3=0
1850 S4=N
1860 S4=INT(S4/2)
1870 IF S4=0 GOTO 2060
1880 S3=S3+1
1890 PRINT @490,"PASS #"S3;
1900 FOR S5=1 TO S4-1
1910 S1=S5
1920 S2=S5+S4
1930 S6=0
1940 IF N$(S1)<N$(S2)GOTO 1990
1950 S6=1
1960 SS$=N$(S1)
1970 N$(S1)=N$(S2)
1980 N$(S2)=SS$
1990 S1=S2
2000 S2=S2+S4
2010 IF S2<N GOTO 1940
2020 IF S6=0 GOTO 2040
2030 GOTO 1910
2040 NEXT S5
2050 GOTO 1860
2060 GOTO 70
2070 FOR X=1 TO 5
2080 CSAVE"DATAFILE"
2090 FOR Y=1 TO 500:NEXT Y:NEXTX
```

(Continued on next page)

Software Review...

TWO LOWER CASE MODS BOTH OUTSTANDING

We hear a lot about the reverse video characters that signify lower case on the 80C's screen. At least two people have done something about them.

Lowercase modification kits change the "checkerboard" of reverse video into real lower case characters with real descenders -- those little tails on G's, J's and Y's that extend below the "line." Makes them more readable.

The modifications are made by MSB Electronics and Micro Technical Products. Both systems -- Micro Tech's *LCA-47* and MSB's *WORD PROCESSING LOWERKIT*, do exactly as advertised: They create attractive true lower case on the 80C screen. Both work on the same principle and both are priced about the same (information at the end of review).

The *LCA-47* and the *LOWERKIT* both make use of a feature of the 80C which uses a chip inside the cabinet to control the letters. Both use small circuit boards to enhance the output of the 80C's chip (called a VDG, or Video Display Generator). Both systems involve opening the 80C case (and voiding the 90-day warranty). But installation of each is simple, and can be done in only a few minutes. Both also have the capability of being controlled from outside the cabinet.

The *LOWERKIT's* characters are designed like those of the Model I. They are somewhat the larger of the two character sets and are very easily seen from across the room. By contrast, the *LCA-47* offers a slightly more compact character. It, too, is easily seen at a distance. The proof of the pudding here is probably in the asterisk -- and both give you a real asterisk, not just a black dot.

Both also give you a slash through the zero. Nice. It makes it a lot easier to distinguish between zeros and letter O's. That's the same reasoning we use in printing listings in *the RAINBOW*. And we think it helps.

One word of caution. Neither kit will be easy to install if you have one of the earliest 80C's. In those models, the VDG chip was soldered directly to the board. If you are going to get one of these -- open the case and see what the score is. Desoldering the chip is not easy and, unless you are very good at that sort of thing, don't try it. As an added caution, the *LCA-47* will not work with Computerware's 32K upgrade. And, to Micro Tech's credit, they advertise that fact.

Besides the manner in which each of these products constructs letters, there isn't a whole lot of difference...except.

Micro Tech offers its board with two switches on top. You can use them to choose whether you want light letters on a dark background or dark letters on a light background. The reverse is particularly appealing on a black-and-white TV. You also have the ability to switch the lowercase off and on. You can set up the switches to operate from outside the cabinet.

The *LOWERKIT* offers an external switch as an additional feature. In addition, it adds a number of "different" graphic symbols (circles, squares and fine lines) which can be accessed by POKing them onto the screen.

Both products are first class, well made and worked as described.

(WORD PROCESSING LOWERKIT, marketed by Spectrum Projects, 93-15 86th Drive, Woodhaven, NY, 11421, $79.95

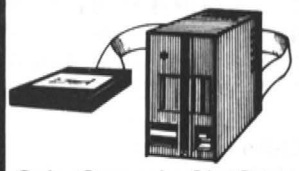
(LCA-47, Micro Technical Products Inc., 814 N. Keating Ave., Mesa, AZ, 85202, $75)

FILE (From Page 61)

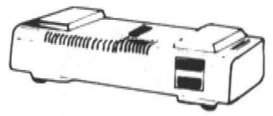
```
3000 PRINT @132,"  device to be
used:"
3010 PRINT:PRINT"        d - dis
k"
3020 PRINT"        t - tape"
3030 IF I$="A" OR I$="ADD" THEN
PRINT"        k - keyboard"
3040 PRINT:PRINT@320,"        yo
ur choice?";:X=USR(0)
3041 I$=INKEY$:IF I$=""THEN3041
3042 IF I$="D" THEN TY=1 ELSE IF
 I$="T" THEN TY=-1 ELSE IF I$="K
" THEN TY=3 ELSE IF I$=CHR$(13)
THEN 70 ELSE SOUND 50,2:GOTO3041
3045 RETURN
3050 GOSUB3500:PRINT" these are
the files contained  in the dis
k at this time:":Z=USR(0):FOR W=
3 TO 11
3060 DSKI$0,17,W,A$,B$
3070 C$=A$+LEFT$(B$,127)
3080 NAM$(0)=LEFT$(C$,8)
3090 EXT$(0)=MID$(C$,9,3)
3100 FOR Z=1 TO 7
3110 NAM$(Z)=MID$(C$,Z*32+1,8)
3120 EXT$(Z)=MID$(C$,9+Z*32,3)
3130 NEXT Z
3140 FOR ZZ=0 TO 7
3150 IF EXT$(ZZ)="DAT" AND LEFT$
(NAM$(ZZ),1)<>CHR$(0)THEN PRINT
"  "NAM$(ZZ),
3160 NEXT ZZ,W
3170 RETURN
3500 SOUND150,2:CLS(0):PRINT"
   universal data file"
3510 PRINT"      ---------------
----"
3530 RETURN
4000 FOR I=0TO7:READ E$:E=VAL("&
H"+E$):POKE I+&HE03,E:NEXT
4010 DEFUSR0=&HE03:X=USR0(&H0E18
):GOTO10
5000 PRINT@134,"a - add data"
5010 PRINT@166,"f - find item";
5020 PRINT@198,"p - print entire
 file";
5030 PRINT@230,"s - sort data";
5040 PRINT@262,"e - exit to basi
c";
5050 X=USR(0):RETURN
```

From Computer Plus to YOU . . .

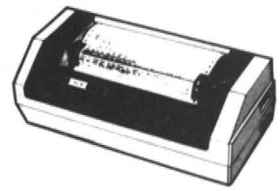
PLUS after PLUS after PLUS



Color Computer Disc Drive $470



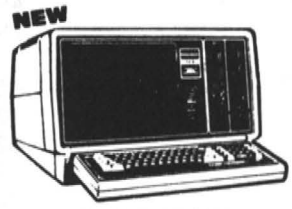
32K Exp. Int. $334



Line Printer VII $315

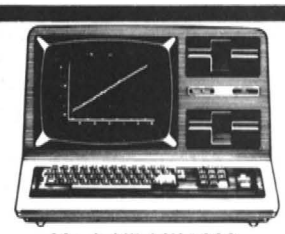


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STARS FALL ON 80C

16K ECB

This neat little program from Ray Moses of Moses Engineering will give you a display of the sky using a variety of times of the year.

The program, as it is listed below, explains what inputs have to be made and how to make them. Once those inputs are made, *STARMAP* will show you the sky at the time of year that you ask it to.

Some 80C's may get slightly hung up running this program and will display a large number of lines when the star map is drawn. This usually happens the first time the program is run, but can happen other times, too. If it happens to you, just BREAK the program and RUN it again. That should clear things up.

There are several options here as to display of the sky in terms of time of the year and hemisphere.

We hope you enjoy this program.

```
1 PCLS0:SCREEN1,1
2 FOR N=1 TO 10:LINE(128+2*N*COS
(N),N*SIN(N)+90)-(128,90),PSET
3 SCREEN1,1:NEXT N
4 FOR T=1 TO 200:NEXT T
10 CLS(3)
20 PRINT@160,"  MOSES ENGINEERIN
G PRESENTS          COMPUTERIZED
STAR MAP"
30 FOR T=1 TO 3000:NEXT T
40 PRINT"IN THE FALL HOUR 0 IS O
PPOSITE  THE SUN. IN THE WINTER
6, IN THESPRING 12, IN THE SUMME
R 18.     THIS MAP HAS 0(FALL) ON
 THE     LEFT. WINTER COMES NEXT
. SUMMER "
42 PRINT"SKIES ARE TO THE RIGHT
OF THE   SCREEN.  YOUR CENTER SC
REEN IS  OCCUPIED BY SPRING."
44 PRINT"FOR THE WHOLE SKY ENTER
 W, FOR A 90X90 DEG SQUARE ENTER
 S. FOR A SOUTHERN HEMISPHERE SQ
UARE       ENTER SS."
45 PCLEAR4:CC=-10
46 INPUT M$
47 IF M$="W" THEN 50
48 INPUT"ENTER THE HOUR OF THE C
ENTER    OF THE SQUARE";CC
49 PCLS0:SCREEN1,1:FOR T=1 TO 40
:NEXT T
50 PCLS3
65 PMODE3,1
70 COLOR1,0
80 LINE(240,0)-(240,191),PSET
84 PAINT(250,10),4,1
90 DRAW"BM250,20L5D5R5D5L5BD10R5
L3D10BL2BD10ND10R5D5ND5NL5L5BD15
ND10R5D5L5F6BD20ND10G3H3D10BD10N
D10R5D5NL5D5BL5BD10ND10R5D5L5"
100 SCREEN1,0
```

WHAT IS THE SOLUTION ?

```
OK
LIST
10 'Demo of the SOLUTION - Snake Mountain
Software (screen print of display)
20 FOR X=1 TO 30 STEP 4
30 CIRCLE(200,96),X,0
40 NEXT X
50 FORX=32 TO 127
60 PRINTCHR$(X);" ";:NEXTX

OK


RUN
   ! " # $ % & ' ( ) * + , - . / 0 1 2 3 4
5 6 7 8 9 : ; < = > ? @ A B C D E F G H I
J K L M N O P Q R S T U V W X Y Z [ \ ] ↑
← ' a b c d e f g h i j k l m n o p q r s
t u v w x y z { | } ~ 
```



One of the major complaints about the Color Computer is the small screen size and the reverse upper case to represent lower case. The SOLUTION was developed to fix these problems. It is written in machine language, hence it is fast. It provides a screen of 42 characters per line, with 21 lines displayed. All the characters are in a 5X8 matrix and are very readable. The program even provides true lower case characters with decenders.

The SOLUTION is linked to Basic so all PRINT and LIST commands work normally. The SOLUTION uses the high resolution graphic mode, and graphics may be intermixed with text. Others features include:

1) double size character mode with 10 lines for small children or the visually impaired 2) ability to reverse all characters 3) a mode which allows for 4 lines of text at the bottom of a PMODE 4 graphic screen (just like some other famous computers) 4) the program is fast-it will print at over 500 characters per second------The price of this is only $12.95 +$1.00 for shipping.

Special this month-order the SOLUTION and for $1.00 get a screen print program-works with all graphic modes,is relocatable, print anywhere on a page, works with the SOLUTION

SNAKE MOUNTAIN SOFTWARE,P.O. BOX 5722,RALEIGH, NC 27650

```
110 PAINT(20,20),3,1
115 FOR N=1 TO 300
120 READ H,D,M
125 IF H=25 THEN 1000
130 IF M=1 THEN B=2
140 IF M=2 THEN B=1
150 IF M=3 THEN B=4
154 IF CC=-10 THEN GOSUB 2000
160 IF CC<>-10 THEN GOSUB 3000
170 SCREEN1,0
200 DATA 6.7,-16,1,6.3,-52,1,14.
6,-61,1,18.6,39,1,14.2,19,1,5.2,
-8,1,5.2,46,1,7.6,5,1,1.6,-57,1,
14,-60,1,19.8,9,1,4.6,16,1,12.4,
-63,1
210 DATA 16.4,-26,1,5.9,7,1,13.3
,-11,1,7.7,28,1,22.9,-30,1,20.7,
45,1,12.7,-59,1,10.1,12,1,7.5,32
,2,2,89,2
220 DATA 11,62,2,14.9,74,2,21.3,
62,2,.9,61,2,2,42,2,2.1,23,2,1.9
,21,2,1.1,35,2,1.3,60,3,.6,56,2,
.1,59,2,.1,29,2,.7,-18,2,.4,-43,
2,23,28,2,23.1,15,2,1.2,15,3,22.
7,47,2,22.1,-47,2,21.7,10,2
230 DATA 2,42,2,2.1,23,2,3.1,41,
2,3.3,50,2,3.9,33,3,5.9,45,2,5.9
,37,2,5.3,28,2,3.7,27,3,4.4,19,3
,5.3,7,2,5.6,-3,2,5.5,-2,2,5.4,-
1,2,5.7,-10,2,6.6,17,2,6.3,-18,2
,7.1,-27,2,7.3,-29,2,6.3,22,3,6.
6,24,3,7.3,22,3
240 DATA 8.3,-59,2,8.7,-54,2,8.1
,-47,2,8,-40,2,9.4,-8,2,11,56,2,
10.2,20,2,11.8,15,2,11.2,21,2,11
.9,53,2,12.2,57,3,12.9,56,2,12.2
,-17,2,12.6,-48,2,13.7,-53,2,13.
7,50,2,13.3,55,2,14.7,28,2,14.1,
-37,2,14.6,-42,2
242 DATA 15.9,-22,2,15.2,-9,2,15
.7,7,2,15.6,27,2,14.5,38,3,15,40
,3,15.2,34,3,16.6,-10,2,16.1,-20
,2,15.9,-26,3,16.3,-25,3,16.6,-2
8,3,16.7,-33,2,16.7,-38,2,17.6,-
43,2,17.7,-39,2,17.1,-16,2,17.5,
-37,2
244 DATA 17.5,13,2,17.9,52,2,18.
7,33,3,19,32,3,18,-30,3,18.3,-35
,2,18.3,-30,3,18.4,-25,3,18.7,-2
7,3,18.8,-26,2,19,-30,2,19.1,-28
,3,19.7,35,3,20.3,40,2,20.7,34,2
,19.5,38,3,20.3,-57,2,21.7,10,2,
9.2,70,2,14.7,69,2
260 DATA 25,25,25
950 NEXT N
1000 SCREEN1,0
1005 RESTORE
1010 GOTO 1000
2000 REM
2400 PSET(240-10*H,-D+90,B)
2450 SCREEN1,0
2500 RETURN
3000 IF M$="SS" THEN 4000
3005 IF D>70 THEN RETURN
3100 REM
3110 IF D<-20 THEN RETURN
3210 IF H<CC-18 THEN H=H+24
3220 IF H>CC+18 THEN H=H-24
3232 IF H>CC+6 THEN RETURN
3234 IF H<CC-6 THEN RETURN
3240 PSET(120-20*(H-CC),-2*(D+20
)+180,B)
3300 SCREEN1,0
3500 RETURN
4000 IF D>0 THEN RETURN
4210 IF H<CC-18 THEN H=H+24
4220 IF H>CC+18 THEN H=H-24
4232 IF H>CC+6 THEN RETURN
4234 IF H<CC-6 THEN RETURN
4240 PSET(120-20*(H-CC),-2*(D+90
)+180,B)
4300 SCREEN1,0
4500 RETURN
```




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RAINBOW

Software Review...

BLACKJAK IS A FINE 4K GAME

We can easily say some very nice thinks about *BLACKJAK* from Rainbow Connection Software (3514 6th Place NW, Rochester, MN, 55901, $11.95 with *MATH TUTOR* on a twinpack cassette - $2 discout for *RAINBOW* subscribers).

Without using any graphics whatsoever, Rainbow Connection does give you cards (by blacking the screen except where the cards are displayed) and makes the playing of the game simple and enjoyable. And, for those of us who can't add, it totals up the points as well.

That all of this is done in only 4K, including the maintanence of the card deck arrays, is quite something. The game also keeps track of three players' winnings and losings, and allows the surviving player(s) to keep on even when someone goes broke.

The flip side of the tape, *MATH TUTOR* is a bonus but nothing particularly special. It is your standard add, subtract, multiply and divide drill but does let you decide how high the numbers should be and keeps up with the right and wrong answers.

MATH TUTOR does the job ably and well, but with no particular flair. *BLACKJAK*, on the other hand, is quite a programming accomplishment for 4K and fun to play, too.



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Tip...

SPEED UP YOUR DISK

A letter in our March issue reported on a way you might be able to make your 80C work with the POKE speedup even if you have the "slow" chips. But it didn't solve the problem of making your disk operate at the faster speed.

If you remove capacitor 85 -- in addition to 73 and 75 which *may* let you operate at the faster speed without a disk -- the disk I/O should work all right.

You should note that you will void your warranty if you open the computer case. And, you should be aware that this is but one possible solution.

Read the letter in the March issue for further details.

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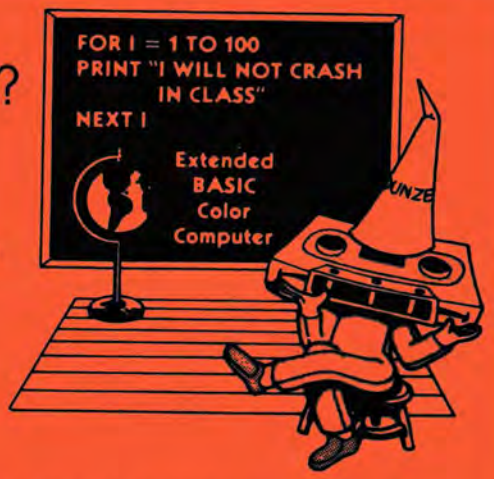
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